PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

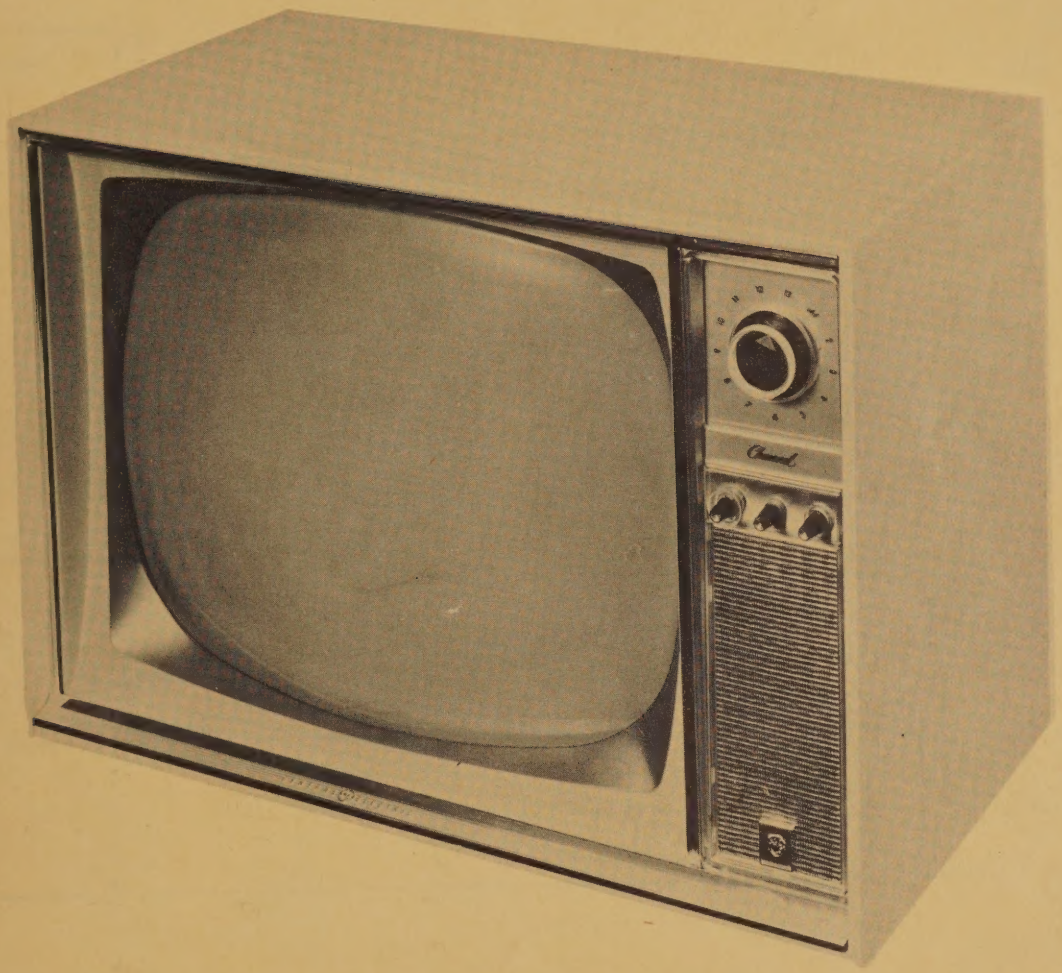
GENERAL ELECTRIC
"M5" LINE

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

GENERAL ELECTRIC
"M5" LINE



MODEL 21T3421 (Ch. M5)

GENERAL ELECTRIC
"M5" LINE

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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DATE 11-59

SET 465 FOLDER 1

PHOTOFACT* Folder with CIRCUITRACE*

GENERAL ELECTRIC "M5" LINE

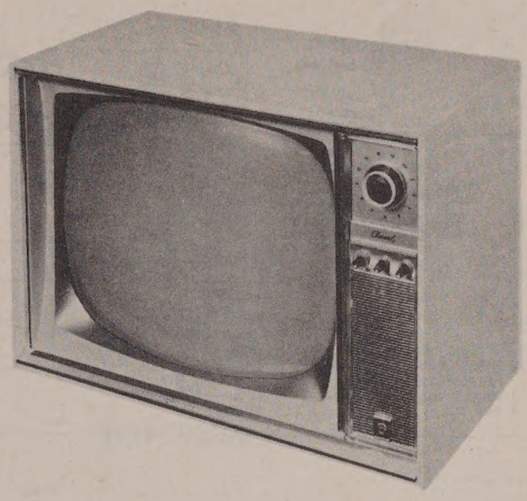
17T3318

GENERAL ELECTRIC "M5" LINE

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL 21T3421

1. Remove 6 push-on type knobs from front of cabinet.
2. Remove 9 metal screws holding rear cover. Remove the rear cover.
3. Remove speaker leads, HV lead, picture tube socket and yoke clamp.
4. Remove 5 chassis bolts from bottom of cabinet.
5. Remove 2 metal screws holding tuner mounting bracket.
6. Remove chassis and yoke.



MODEL 21T3421 (Ch. M5)

TRADE NAME	General Electric	MODELS	CHASSIS
		17T3304, 17T3305, 17T3306, 17T3310, 17T3311, 17T3315, 17T3316, 17T3317, 17T3318, 17T3320, 17T3321, 17T3331, 21C3439, 21C3440, 21C3441, 21C3442, 21C3443, 21C3445, 21C3446, 21C3450, 21C3451, 21C3458, 21C3459, 21C3460, 21C3461, 21C3478, 21C3479, 21C3482, 21C3483, 21L3455, 21L3456, 21T3417, 21T3418, 21T3419, 21T3420, 21T3421, 21T3425, 21T3429, 21T3430, 21T3431, 21T3432, 21T3435, 21T3436 & UHF	M5
MANUFACTURER	General Electric Co., Appliance & Television Receiver Div., Louisville, Ky.		
TYPE SET	Television Receiver		
TUBES	VHF-Sixteen, UHF-Seventeen		
POWER SUPPLY	110-125 Volts AC, 60 Cycle	RATING 175 Watts, 1.6 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 4 screws holding the trim strip at the bottom edge of the safety glass. Tilt glass out and remove.

FUSE

Two fuses and a fuse wire are used for low voltage power supply, horizontal sweep circuit and filament protection.

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, it is necessary to remove the chassis. (See "Disassembly Instructions".)

AGC

No provision is made to vary the AGC on this receiver.

FOCUS

The focus may be varied by connecting the lead from pin 4 of the picture tube to various voltage points. (For location, see photo "Chassis-Front View".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Frequency slug. (For location, see "Tube Placement Chart".)

WIDTH

The width may be varied by a Width switch. (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Ratio Detector secondary (A9) located on top of chassis.

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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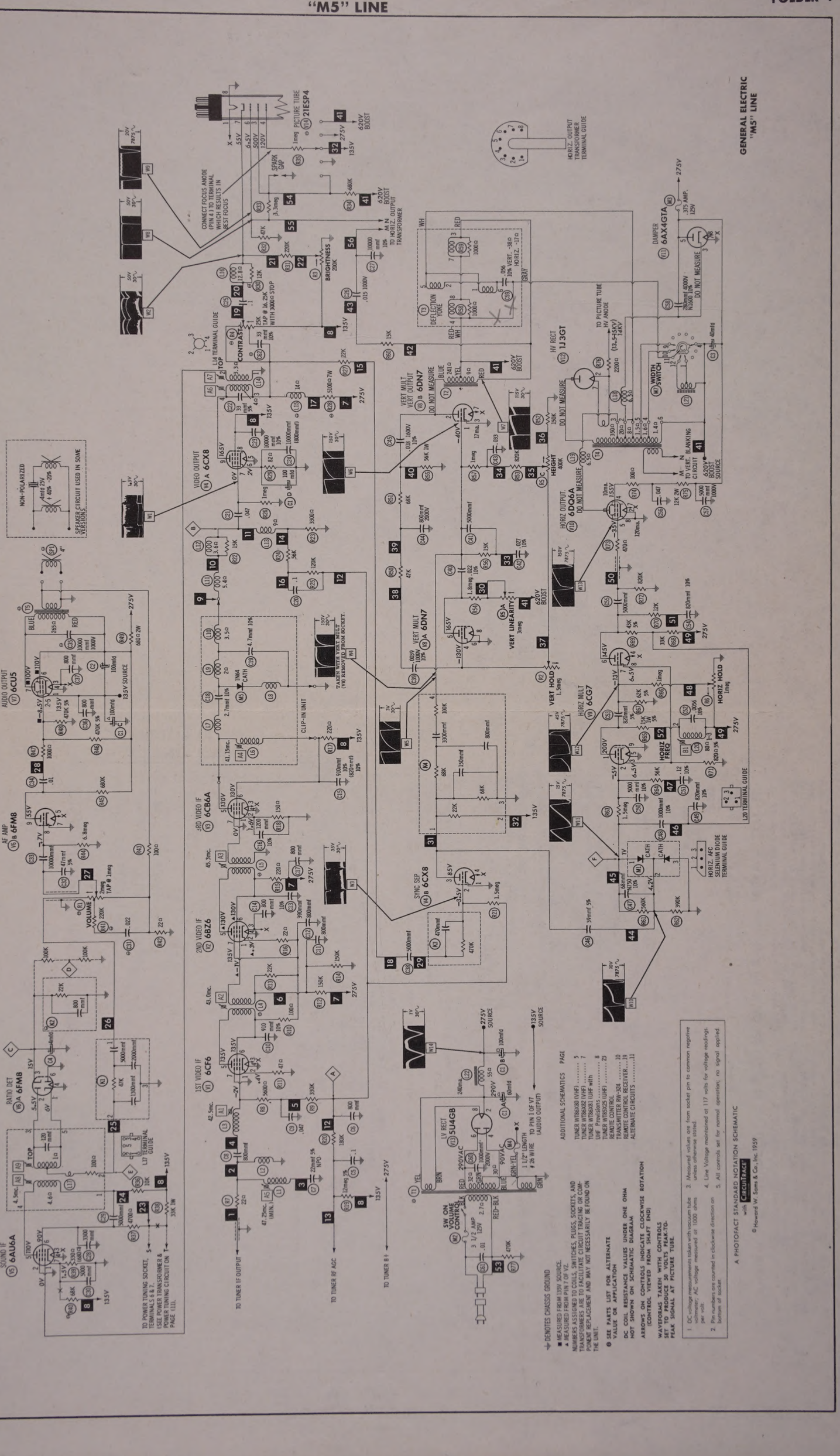
SET 465 FOLDER 1


GENERAL ELECTRIC
"M5" LINE
SOUND IF
(V5) 6AU6A
RATIO DET
(V6) A 6FM8
AF AMP
(V6) B 6FM8
AUDIO OUTPUT
(V7) 6CU5
VIDEO OUTPUT
(V4) A 6CX8
1ST VIDEO IF
(V1) 6CF6
2ND VIDEO IF
(V2) 6BZ6
3RD VIDEO IF
(V3) 6CB6A
VERT MULT
VERT OUTPUT
(V8) B 6DN7
VERT MULT
(V8) A 6DN7
HORIZ MULT
(V9) 6CG7
HORIZ OUTPUT
(V10) 6DO6A
DO NOT MEASURE
SYNC SEP
(V4) B 6CX8
LV RECT
(V13) 5U4GB
HV RECT
(V12) 1J3GT
DAMPER
(V11) 6AX4GTA
PICTURE TUBE
(V14) 21ESP4
CONNECT FOCUS ANODE (PIN 1) TO TERMINAL WHICH RESULTS IN BEST FOCUS
SPARK GAP
TO PICTURE TUBE HV ANODE
HORIZ. OUTPUT TRANSFORMER TERMINAL GUIDE
L14 TERMINAL GUIDE
L17 TERMINAL GUIDE
LOT TERMINAL GUIDE
HORIZ. AFC SELENIUM DIODE TERMINAL GUIDE
NON-POLARIZED
SPEAKER CIRCUIT USED IN SOME VERSIONS
CLIP-IN UNIT
TAKEN WITH VERT MULT (V8) REMOVED FROM SOCKET.
TO TUNER IF OUTPUT
TO TUNER RF AGC
TO TUNER B+
TO PIN 1 OF V7 (AUDIO OUTPUT)
TO POWER TUNING SOCKET, TERMINALS 6 & 7. (SEE POWER TRANSFORMER & POWER TUNING CIRCUIT ON PAGE (11).
SW ON VOLUME CONTROL
VOLUME
BRIGHTNESS 200K
CONTRAST
HEIGHT 400K
VERT LINEARITY
VERT HOLD 1.5meg
HORIZ HOLD 1meg
HORIZ FREQ
WIDTH SWITCH
DEFLECTION YOKE
TO VERT. BLANKING CIRCUIT
TO HORIZ. OUTPUT TRANSFORMER
275V SOURCE
135V SOURCE
620V BOOST SOURCE
DENOTES CHASSIS GROUND
■ MEASURED FROM 135V SOURCE.
▲ MEASURED FROM PIN 7 OF V2.
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING ONLY. PARTS REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
ADDITIONAL SCHEMATICS PAGE
TUNER WT860X80 (VHF) 5
TUNER WT860X82 (VHF) 7
TUNER WT860X83 (UHF with UHF Provisions) 8
TUNER WT860X85 (UHF) 25
REMOTE CONTROL
TRANSMITTER RW-324 10
REMOTE CONTROL RECEIVER 19
ALTERNATE CIRCUITS 11
1 DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1000 ohms per volt.
2 Pin numbers are counted in clockwise direction on bottom of socket.
3 Measured values are from socket pin to common negative unless otherwise stated.
4 Line Voltage maintained at 117 volts for voltage readings.
5 All controls set for normal operation; no signal applied
A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE
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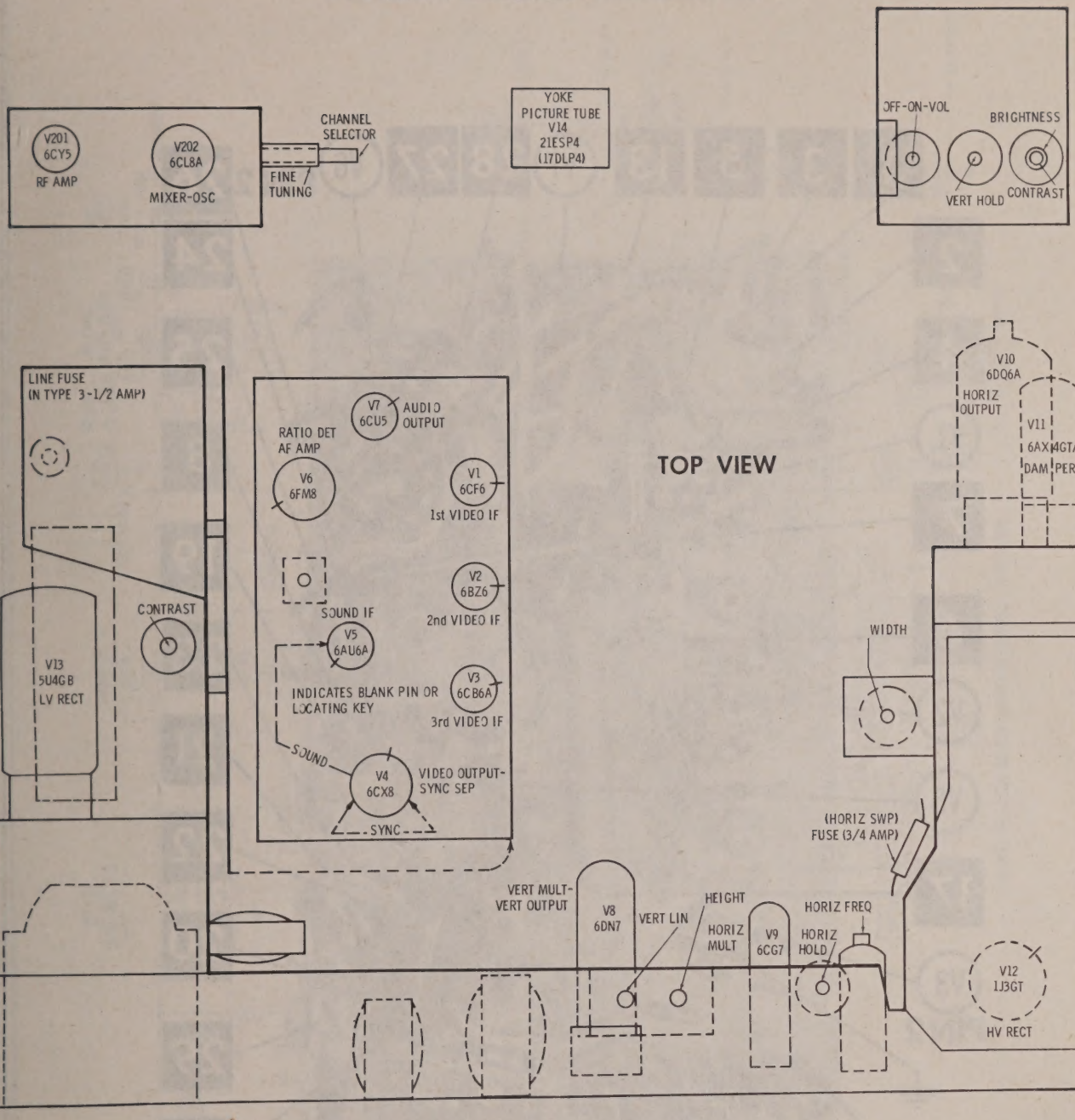
TUBE PLACEMENT CHART



GENERAL ELECTRIC "M5" LINE

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound Fuse (Line), Fuse Wire (Fil.), V13

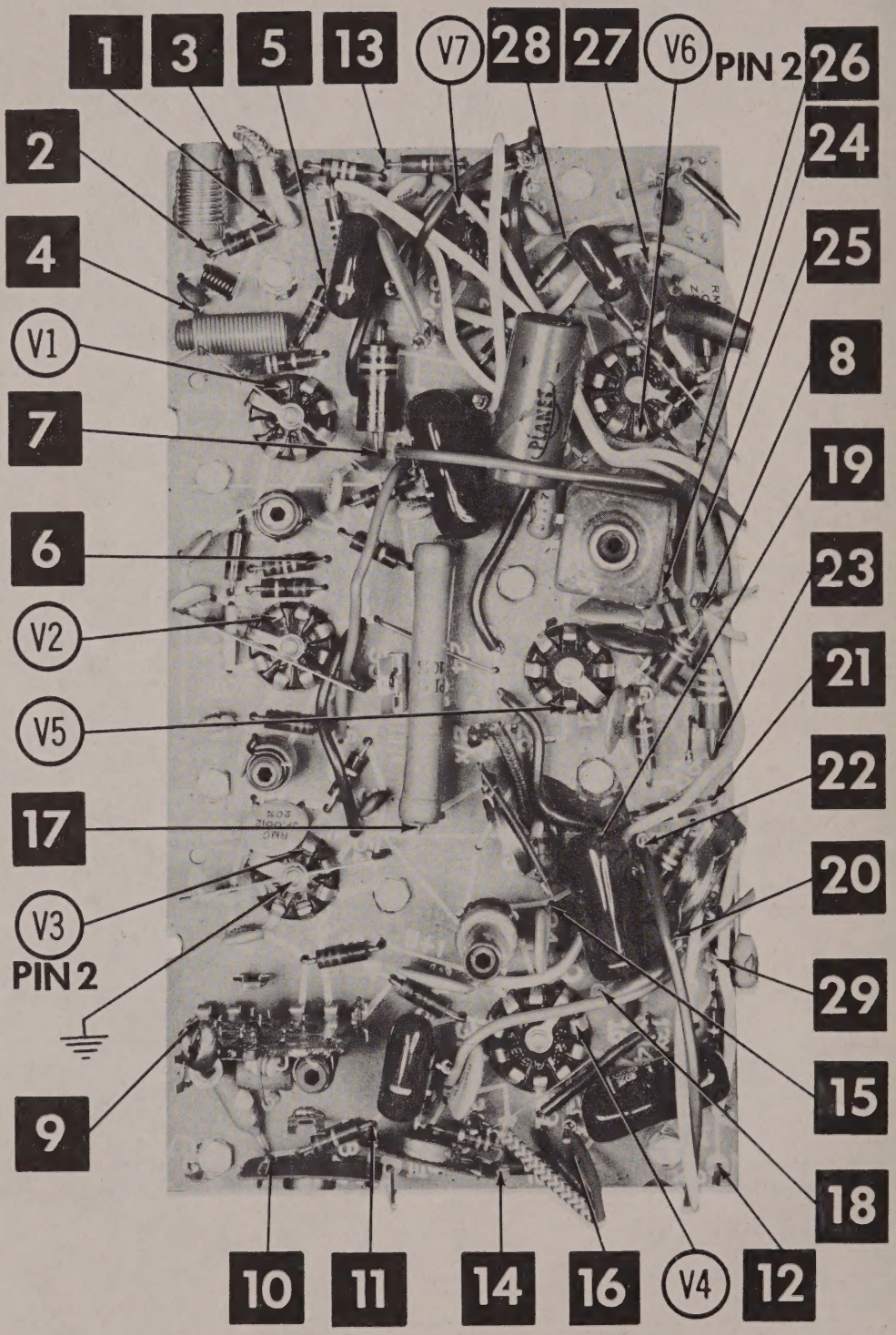
SWEEP FAILURE
No raster, has sound V9, V10, V11, V12, V14, Fuse (Sweep)
No vertical deflection V8
Poor vert. linearity or foldover V8
Poor horiz. linearity or foldover V9, V10, V11
Narrow picture V9, V10, V11, V13
Vert. off freq. V8
Horiz. off freq. Diode (Horiz. AFC), V9

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V5, V6, V7

SYNC FAILURE
No vert. sync V4
No horiz. sync V4, Diode (Horiz. AFC)
No vert. or horiz. sync V4

FOLDER 1

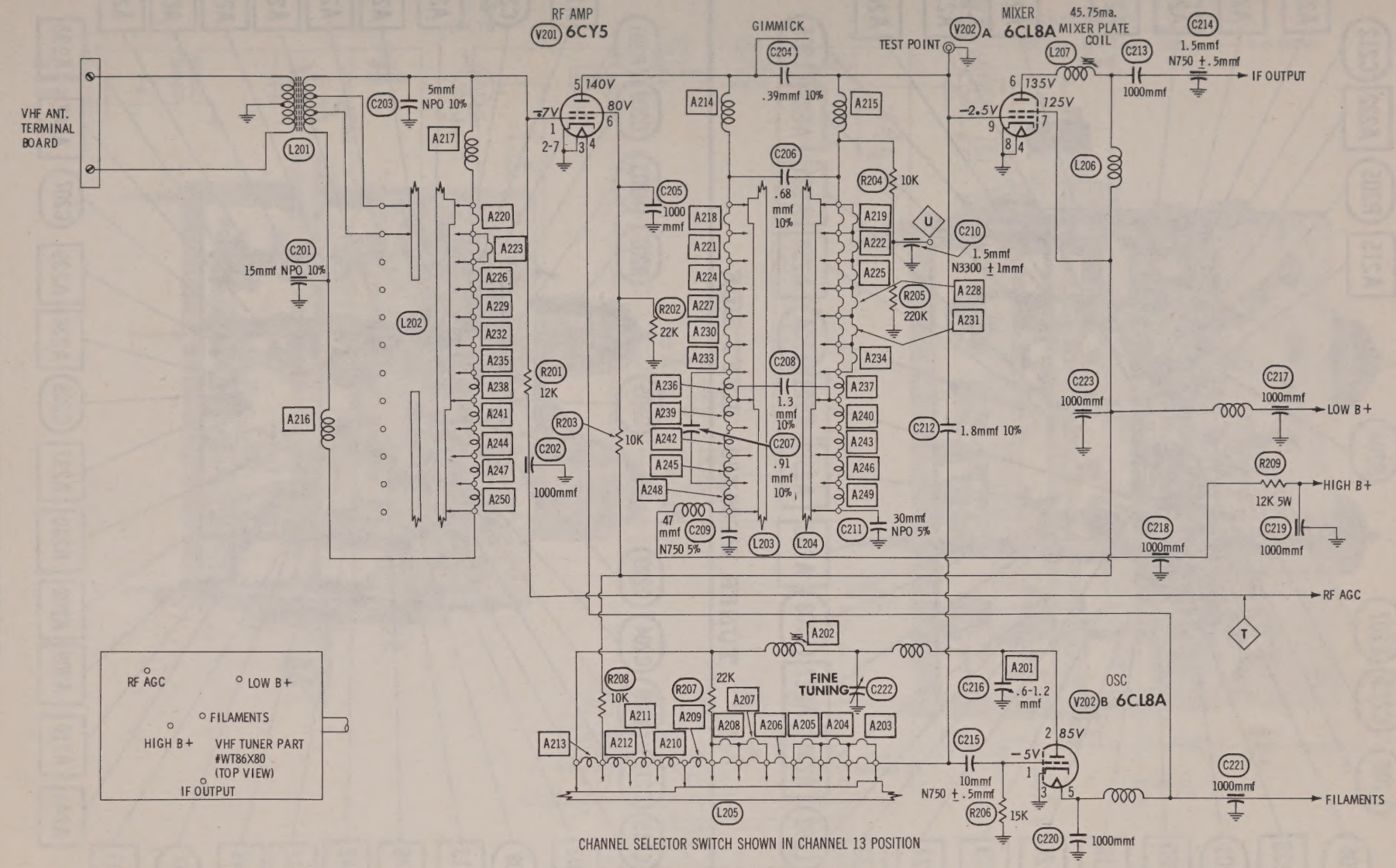
CircuiTrace Numbers 1 thru 29



A Howard W. Sams CIRCUITRACE* Photo

MAIN
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION

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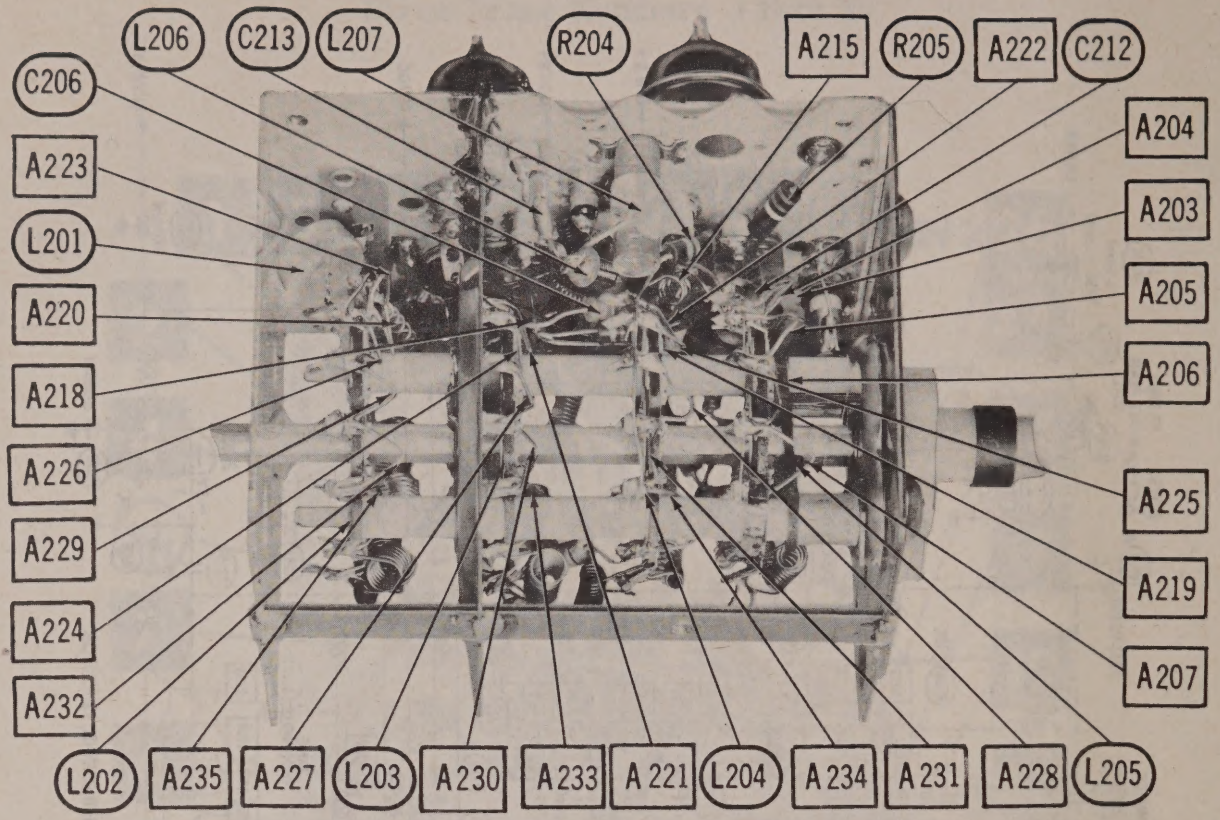
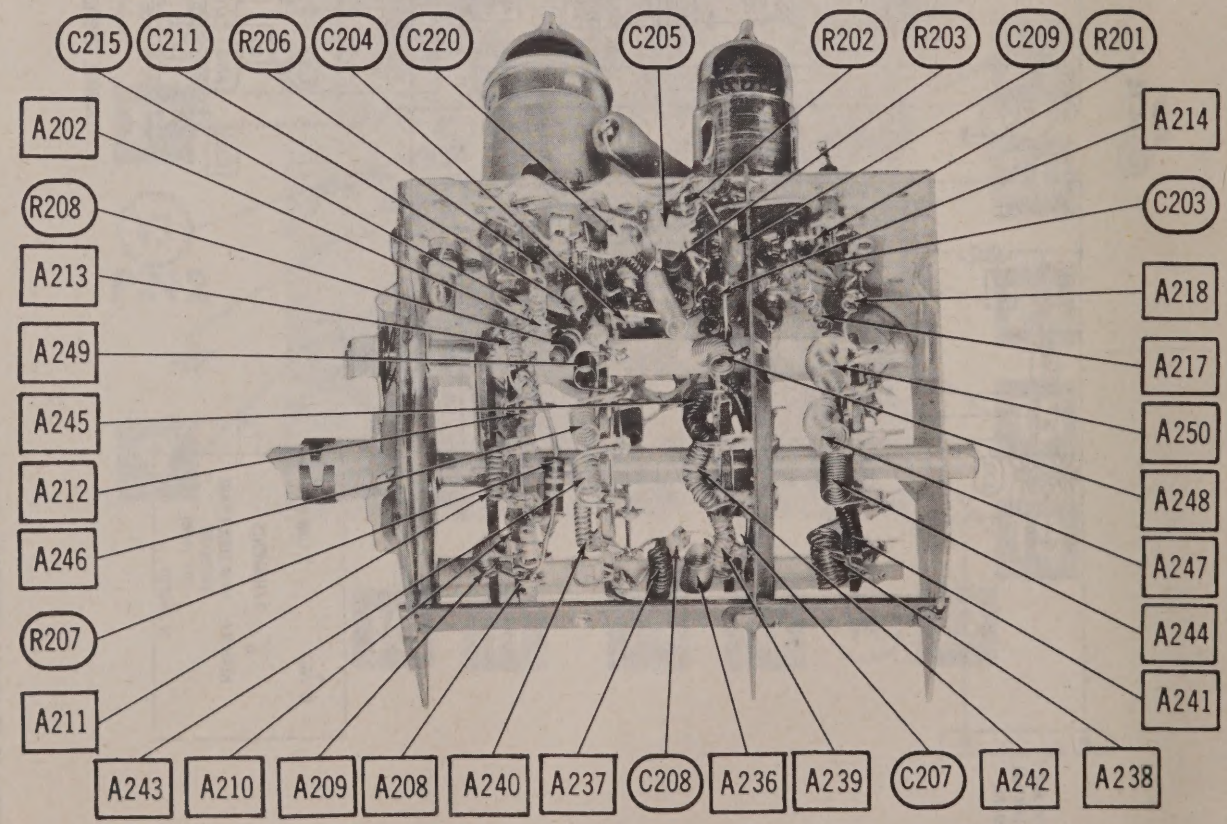
VHF TUNER WT86X80

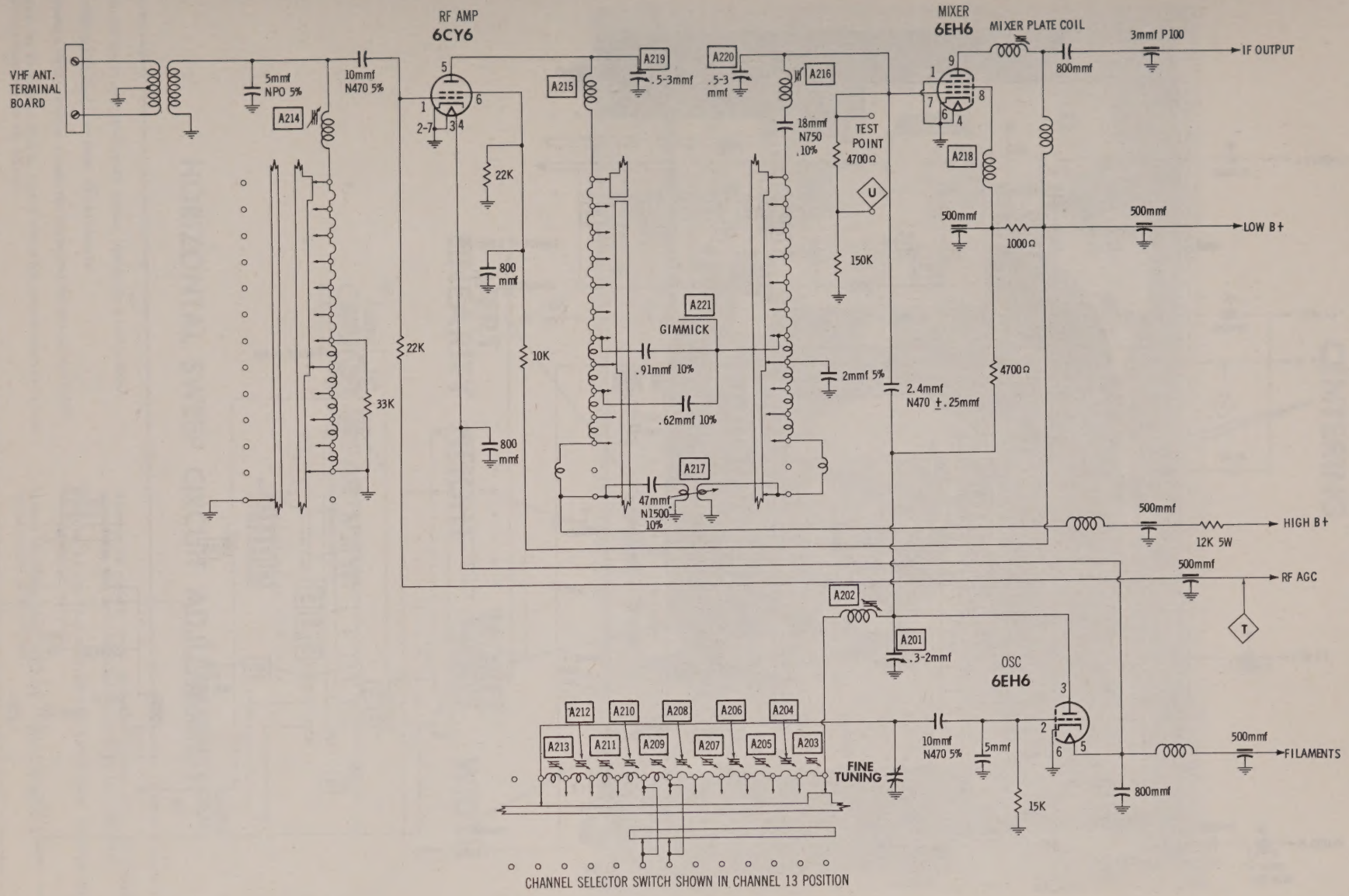
GENERAL ELECTRIC "M5" LINE



TUNER WT86X80 - LEFT SIDE



TUNER WT86X80 - RIGHT SIDE



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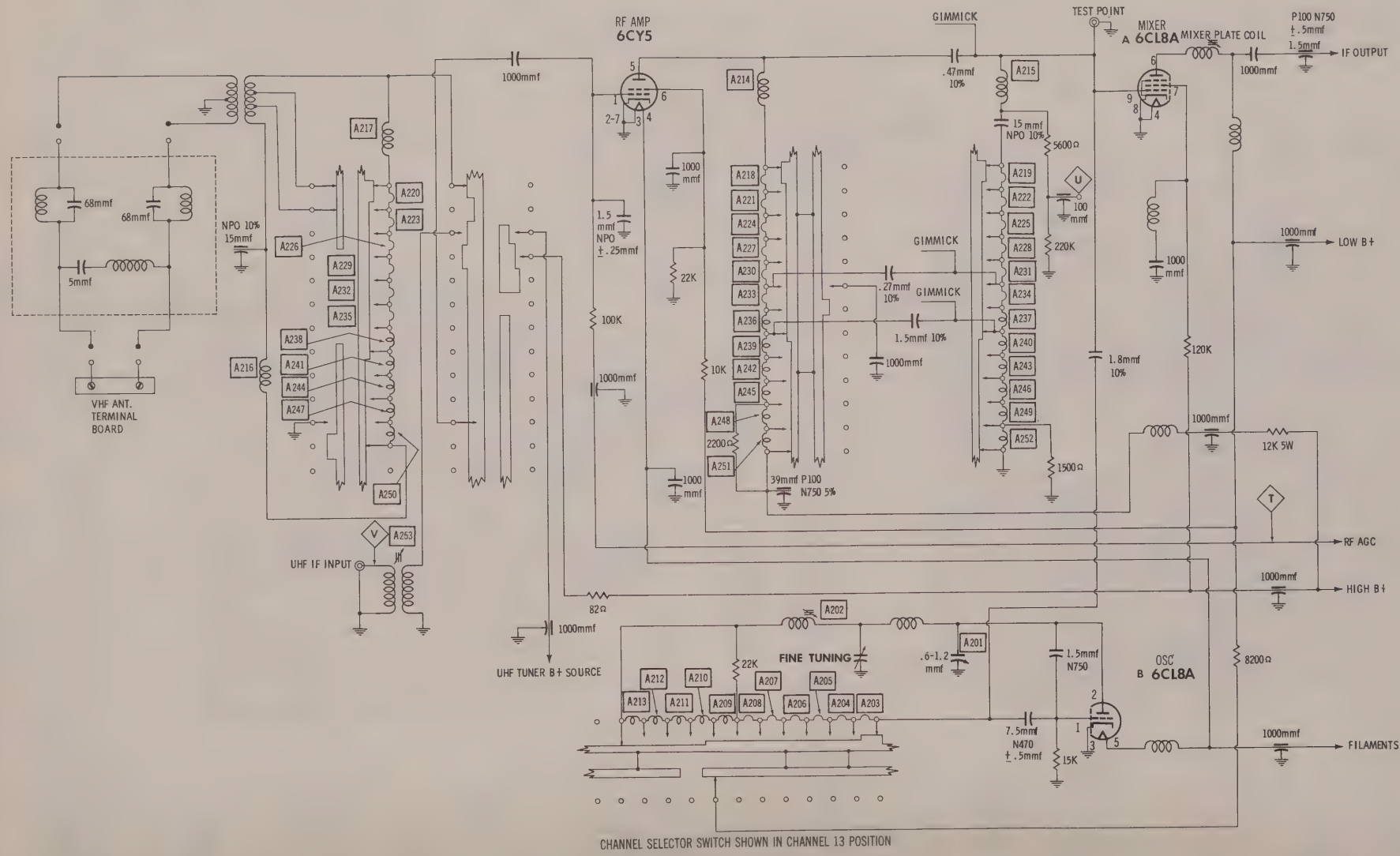
VHF TUNER WT86X82

GENERAL ELECTRIC "M5" LINE



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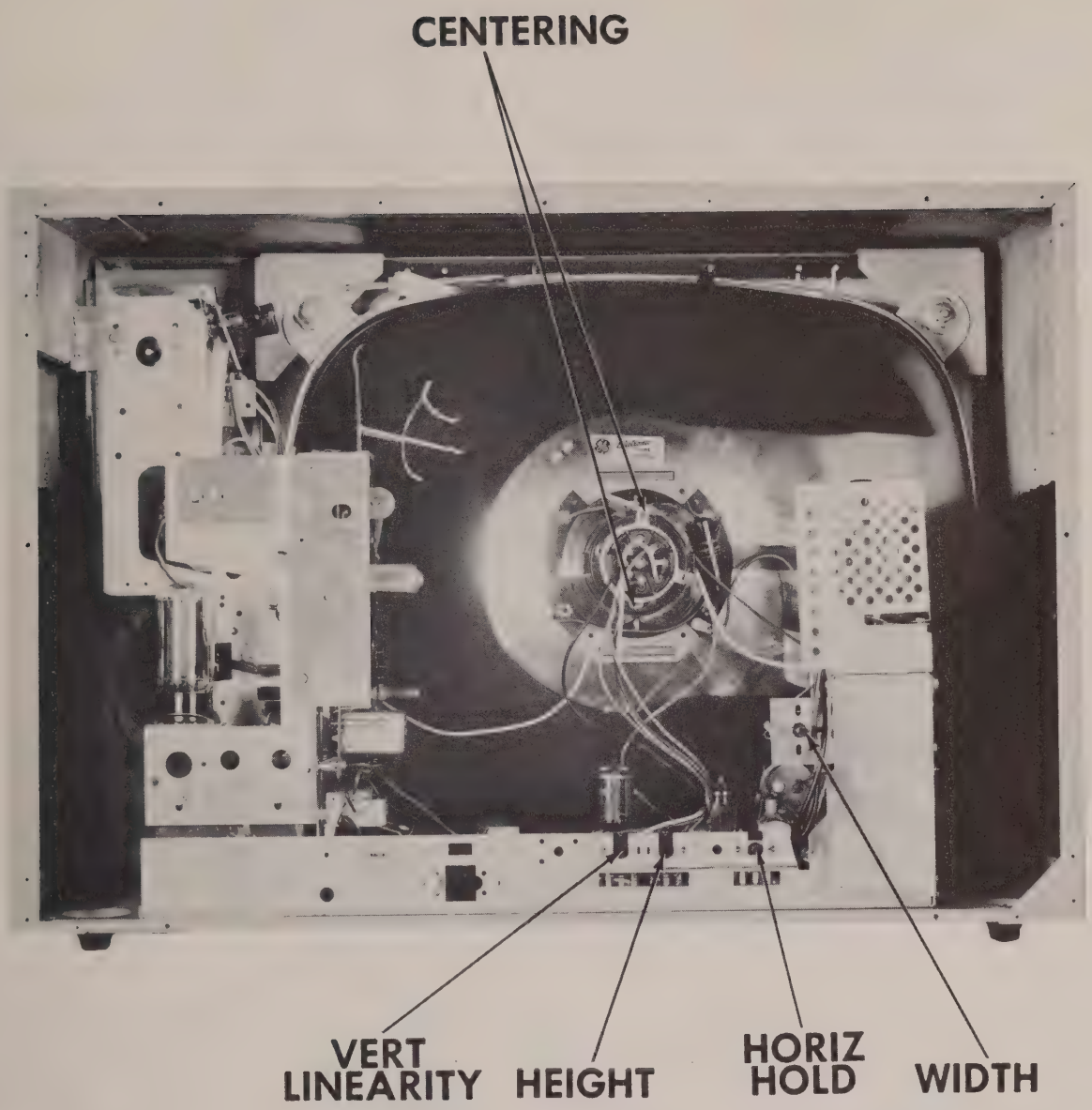
VHF TUNER with UHF Provisions - WT86X81



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV signal, preferably a test pattern.

Connect a clip lead from point Ⓕ to chassis.

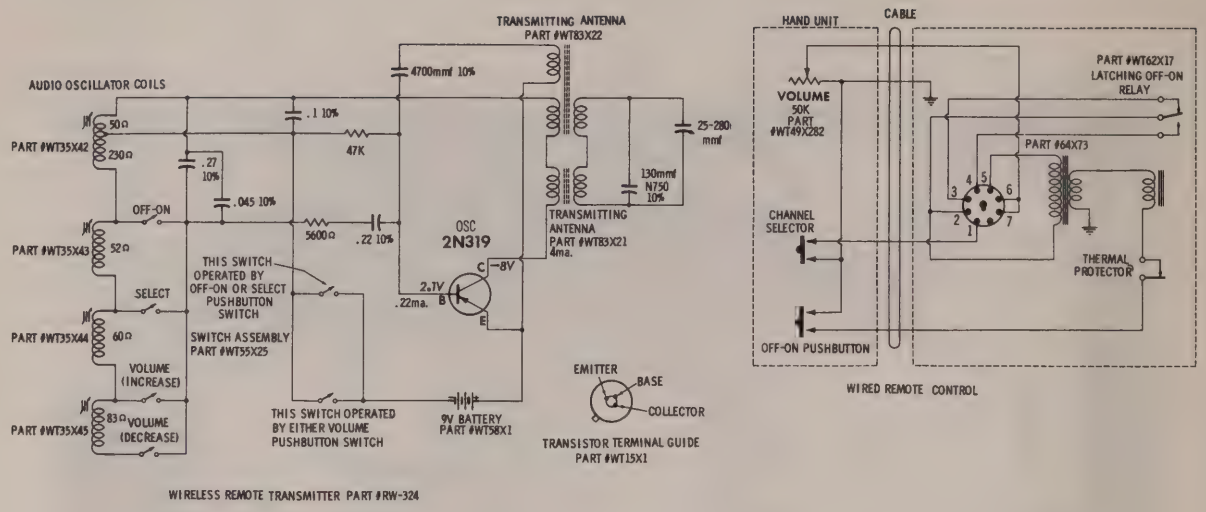
Connect a 1000Ω resistor across the Horizontal Stabilizing coil (L20).

Adjust the Horizontal Hold to a point where the picture appears to float back and forth across the screen.

Remove the resistor from across L20 and adjust the Horizontal Frequency slug (B1) until the picture again floats back and forth.

Remove the clip lead from point Ⓕ and chassis. Readjust the Horizontal Hold, if necessary.

Adjust the Width switch (M7) for a picture SLIGHTLY wider than necessary to fill picture mask.



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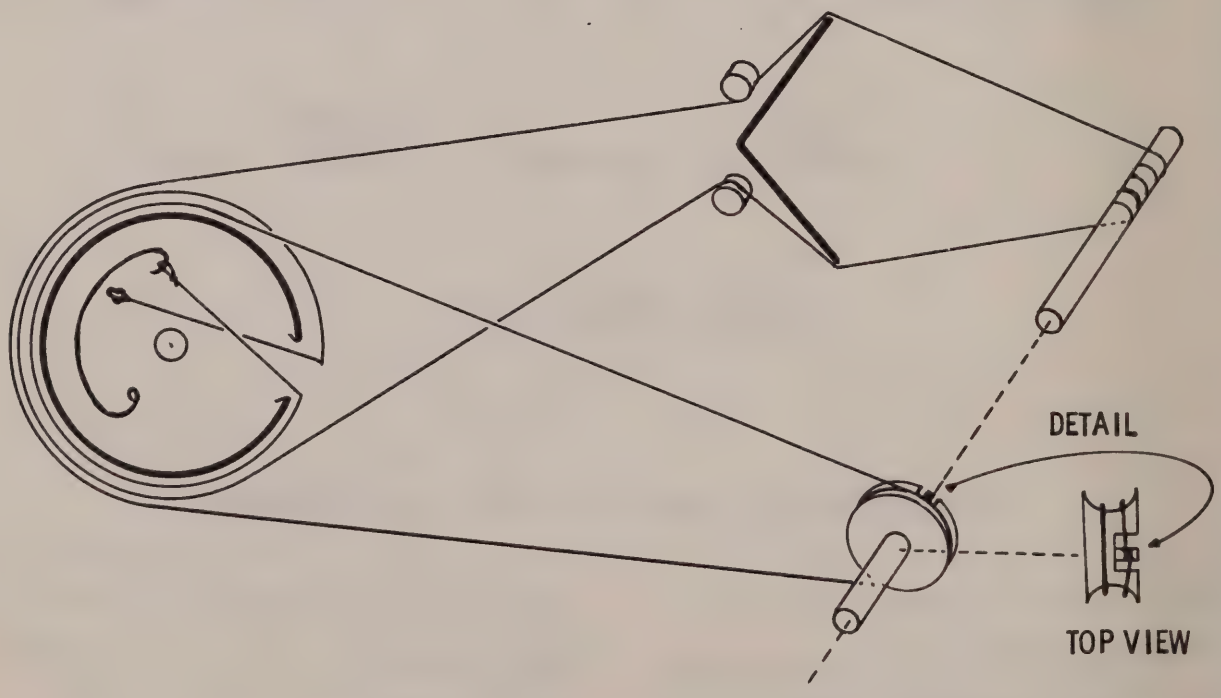
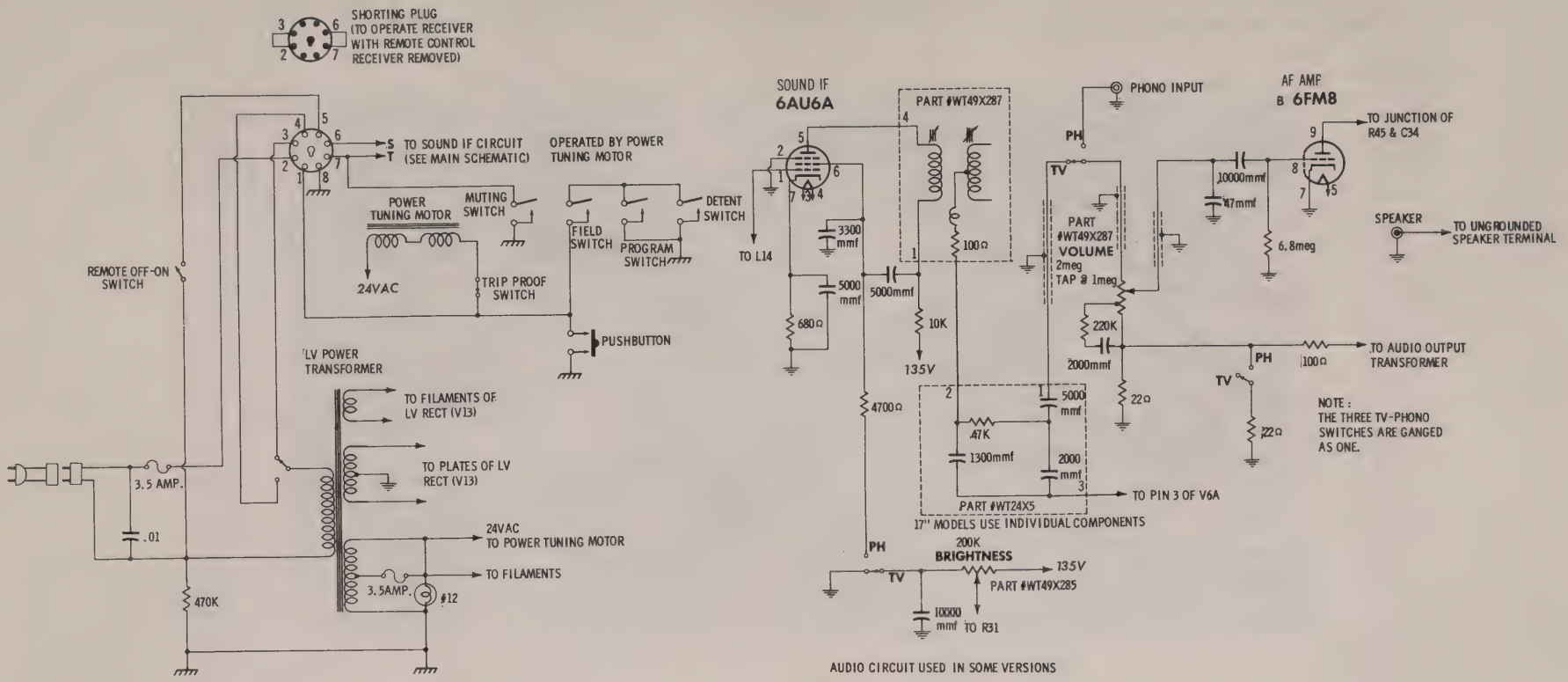
REMOTE CONTROL TRANSMITTER RW-324



UHF DRIVE CORD



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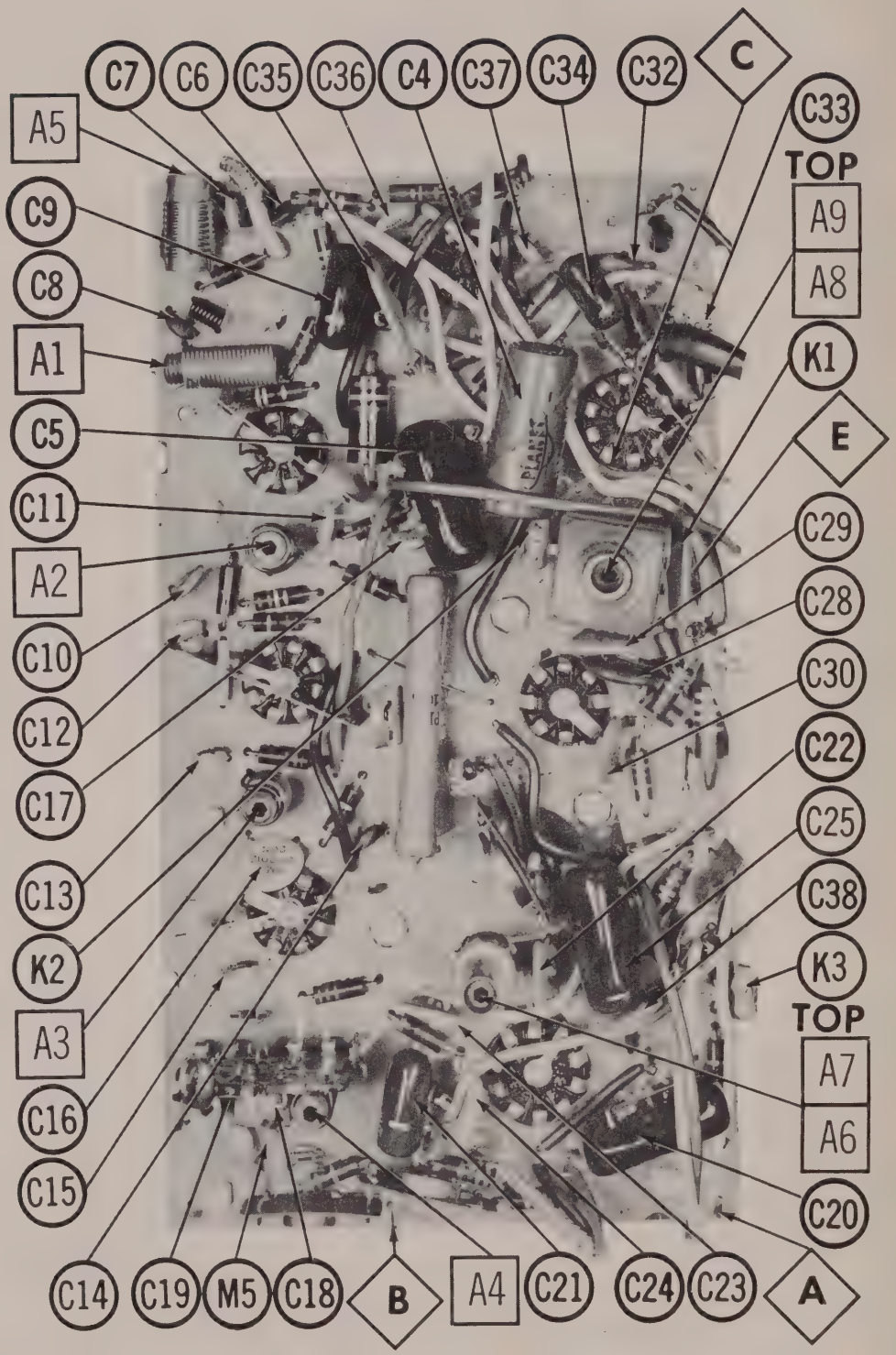
ALTERNATE CIRCUITS

GENERAL ELECTRIC "M5" LINE



MAIN PRINTED BOARD - CAPACITOR & ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Turn Volume control fully counterclockwise and Contrast fully clockwise.
Connect the negative lead of a 4 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 1	Connect thru network (Fig. 1) to Tuner Test Jack located on top of tuner.	Not used	45.75MC (Unmod)	Any non-interfering channel	USE VTVM DC probe thru 22K to point (B). Common to chassis. (Across Video Det. load)	Mixer Plate Coil	Adjust for maximum deflection.
2.	"	"	"	42.5MC	"	"	A1	"
3.	"	"	"	43.0MC	"	"	A2	"
4.	"	"	"	45.3MC	"	"	A3	"
5.	"	"	"	44.15MC	"	"	A4	"
6.	"	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection.
7.	"	"	44MC (10MC Swp)	41.25MC 42.5MC 44.15MC 45.0MC 45.75MC 47.25MC	"	"		Check for response similar to Fig. 2 with markers as shown. If necessary, retouch proper slug (s) to obtain desired response. High frequency side of curve is controlled by Mixer Plate Coil and A3. Low frequency side is controlled by A1 and A2. Adjust A4 to control peak and shape of curve. If necessary, retouch A5 to correctly position 47.25 MC marker.

4.5MC TRAP ALIGNMENT

Connect the negative lead of a 7.5 volt bias supply to point (A). Positive to chassis.
Turn Volume control fully counterclockwise and Contrast fully clockwise.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	.001mfd	High side to point (B). Low side to chassis.	Not used	4.5MC (400∿ 30% AM Mod)	Any non-interfering channel	Vert. Amp. thru demodulator probe to pin 7 (cathode) of picture tube. Low side to chassis.	A6	Adjust for MINIMUM 400∿ indication on scope.

SOUND IF ALIGNMENT

Connect two matched 100K (±1%) resistors in series from point (C) to chassis. The junction of these two resistors is alignment point (D) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001mfd	High side to point (B). Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to point (C). Common to chassis.	A7, A8	Adjust for maximum deflection.
10.	"	"	"	"	DC probe to point (E). Common to point (D).	A9	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

TUNER ALIGNMENT INSTRUCTIONS LOCATED ON PAGES 21, 22, 23

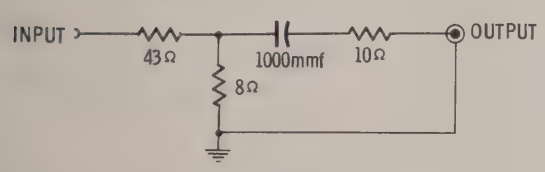


FIG. 1

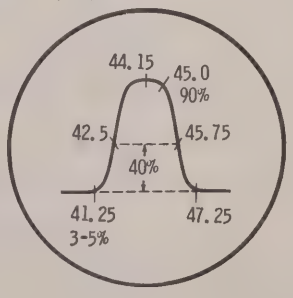


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No	CBS — USE	CBS — TYPE	ITEM No	GENERAL ELECTRIC — USE	GENERAL ELECTRIC — TYPE	ITEM No	RAYTHEON — USE	RAYTHEON — TYPE	ITEM No	SYLVANIA — USE	SYLVANIA — TYPE
V1	1st Video IF Amp.	8CF8	V7	Horiz. Mult.-Vert Output	6DN7	V8	Vert. Mult.-Vert Output	6DN7	V1	1st Video IF Amp.	6CF8
V2	2nd Video IF Amp.	6BZ6	V8	Horiz. Mult.	6CG7	V9	Horiz. Mult.	6CG7	V2	2nd Video IF Amp.	6BZ6
V3	3rd Video IF Amp.	6CB6A	V9	Horiz. Output	6DQ6A	V10	Horiz. Output	6DQ6A	V3	3rd Video IF Amp.	6CB6A
V4	Video Output-Sync Sep.	6CX8	V11	Damper	6AX4GTA	V11	Damper	6AX4GTA	V4	Video Output-Sync Sep.	6CX8
V5	Sound IF Amp.	6AU6A	V12	HV Rectifier	1J3GT	V12	HV Rectifier	1J3GT	V5	Sound IF Amp.	6AU6A
V6	Ratio Det. -AF Amp	6FM8	V13	LV Rectifier	5U4GB	V13	LV Rectifier	5U4GB	V6	Ratio Det. -AF Amp	6FM8
V7	Audio Output	6CU5							V7	Audio Output	6CU5

PICTURE TUBE

ITEM No	REPLACEMENT DATA: G E PART No	GENERAL ELECTRIC PART No	RCA PART No	RAYTHEON PART No	SYLVANIA PART No	NOTES
V14	21ESP4 17DLP4	21ESP4 ① 17DLP4 ①				① Aluminized

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	RATING: VOLT	REPLACEMENT DATA: G E PART No	AEROVOX PART No	CORNELL-DUBILIER PART No	MALLORY PART No	PYRAMID PART No	SPRAGUE PART No	NOTES
C1A	60	350	WT31X365	AFH4-97-95		[FP430, 63 TC483		TVL5-4607. 2*	
B	80	350							
C	100	150							
D	100	10							
C2	100	150	WT31X139	AFH2-21	XA0241	FP318	TMS-23	TVL-1423	
C3	40	450	WT31X139	BR4045	TC78	TD-40-450	TVA-1712		
C4	4	50	WT31X133	PRS400	BBR4-50	TT50X4	TD-4-50	TVA-1402	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA: AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No	SPRAGUE PART No.
C5	.1 200V		P288N-1	DP-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C6	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C7	23 NPO 5%		DTZ-33	CDQ33C			CNQ-433	10TCC-Q33
C8	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C9	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C10	510 10%		DL-1000	DD-911	1R5T91	CCD-102	GP310	10TS-D10
C11	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C12	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C13	390 10%		DL-390	DD-391	L10T39	CCD-391	GP339	10TS-T39
C14	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C15	910 10%	(820 10%) *	DL-1000	DD-991	1R5T91	CCD-102	GP310	10TS-D10
C16	1300 10%		DL-1300		1R5D12	CCD-132	GP312	10TS-D12
C17	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C18	3.7 10%		NPO-3I 3.0		CI0V3C			10TCC-V37
C19	4.7 10%		NPO-3I 4.7	TCZ-4R7	CI0V47C	CCTO-4R7	CNO-547	10TCC-V47
C20	.1 200V		P288N-1	DP-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C21	.047 200V		P288N-047	DD-503	CUB2S47	4DP-3-473	GEM-4147	2TM-S47
C22	33 NPO 5%		DTZ-33		CI0Q33C		CNO-433	
C23	10000 10%		DL-10000		P3MS8	CCD-103	GEM-1611	10TS-S10
C24	10000	(800)*	BPD-01	DD-103	BYA10S	CCD-103	B-110	5HK-S10
C25	.1 400V		P288N-1	DP-104	CUBAP1	4DP-3-104	GEM-401	4TM-P1
C26	.015 1000V		P1088N-015	DD6-153	CUB10S15	16DP-4-153	GEM-10115	10TM-S15
C27	1000 10%		DL-10000			CCD-103		10TS-S10
C28	3300		BPD-0033	DD-332	BYA10D33	CCD-332	B-233	5HK-D33
C29	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C30	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C31	.022 200V	Note 1	P288N-022	DD-223	CUB4S22	4DP-3-223	GEM-4122	2TM-S22
C32	47 N750 5%		DTN-47		CI0Q47U		CN7-447	10TCU-Q47
C33	10000		BPD-01	DD-103	BYA10S	CCD-103	B-110	5HK-S10
C34	.01 400V		P488N-01	DD-103	CUB4S	4DP-3-103	GEM-401	4TM-S1
C35	10000 1000V	Note 1	BPD-01	DD-103	BYA10S	CCD-103	B-110	5HK-S10
C36	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C37	800		BPD-0008	DD-801	L10T8	CCD-831	B-382	10TS-T80
C38	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C39	.0039 1000V 10%				PMG04	16DP-2-402	GEM-1634	10TM-D4
C40	.022 800V 10%				PM8S22	8DP-2-223	GEM-16122	8TM-S22
C41	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D5
C43	.027 500V 10%		V84C8S3-10%		PM8S3	6DP-3-273	GEM-1613	6TM-S3
C43	.033 300V		P288N-033	DD-303	CUB4S3	4DP-3-333	GEM-4133	4TM-S33
C44	800 2000V		HVD-30-820	DD60-821		VCM-35-922M	2HV-392	30GA-T82
C45	.018 1800V 10%					16DP-4-183	GEM-1612	
C46	39 N750 5%			TCN-39	CI0Q39C		CNC-439	10TCU-Q39
C47	68 N750 10%		N750-DI 68	DTZ-68	CI0Q47U	CCTN-681	CN7-468	10TCU-Q68
C48	1000 10%		DL-1000	DD-102	1R5D1	CCD-102	GP310	10TS-D10
C49	830 10%		DL-830	DD-831	1R5T83	CCD-831	GP382	10TS-T82
C50	5000 10%		DL-5000		PM8D5	CCD-503	JL-250	10TS-D50
C51	.12 200V 10%				PM2P15	2DP-3-154	GEM-2015	2TM-P15
C53	.0056 400V 10%				PM6D6	6DP-4-603	GEM-416	6TM-D6
C53	820 5%		1469-00082		1R5T82	CM-20B-821J	MCB251	MS-382
C54	830 10%		DL-830	DD-831	1R5T83	CCD-831	GP382	10TS-T82
C56	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C56	.047		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C57	5000 1000V		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C58	280 4000V N1500 10%	#WT18X374						
C59	.068 800V 10%		P564CM-057			PM6S6	6DP-4-603	GEM-616	6TM-S6
C60	1000 3000V		HVD-30-1000	DD60-102		2VB30D1	VCM-35-1023M	2HV-310	30GA-D10
C61	.01 600V		P668N-01	D6-103		CUB6S1	6DP-2-103	GEM-611	6TM-S1
C62	33 10%	Note 1	NPO-3I 33	TCZ-33		CI0Q33C	CCTO-330	CNO-433	10TCC-Q33

\# G E Part Number. * Alternate value. Note 1. Not used in 17" versions.

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: G E PART No	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No	INSTALLATION NOTES
R1A	2meg 1meg tap	½	WT49X287					Volume, Note 1
B	Switch							Push-Push Off-On
R2A	1 5meg	½	WT49X283	AB-743	A47-1.5meg -S	QII-138	U155	Vert. Hold
B	Shaft			AK-8	RS-3/16	NQ	DS-37	
R3	200K	½	WT49X285					Brightness
R4	25K 16.25 tap	½	WT49X281					Contrast, Note 2

CONTROLS (cont)

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: CENTRALAB PART No	CLAROSTAT PART No	IRC PART No	MALLORY PART No	INSTALLATION NOTES
—	3000Ω stop						
R5A	1meg	½	WT49X274	AB-84 †	B47-3meg-S†	B11-140 †	PTA355L † Vert. Lin.
B	Shaft			AK-19	Not Req	TM4	Not Req.
C	400K	½		AB-59 †	B47-500K-S†	B11-133 †	PTA35L † Height
D	Shaft			AK-19	Not Req	TM4	Not Req
R6A	1meg	½	WT49X273	AB-69	B47-1meg-S	B11-137	PTA1254L Horiz. Hold
B	Shaft			AK-19	Not Req	TM4	Not Req

Note 1. 17" versions use untapped 1meg Volume with switch (Part #WT49X284).
Note 2. 17" versions use 17K Contrast with 15K stop (Part #WT49X269).
† Requires replacing R5A and R5C.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R7	22Ω	
R8	5600Ω	
R9	330K	
R10	100Ω	
R11	47Ω	
R12	150K	
R13	22K	
R14	150K	
R15	220Ω	
R16	22Ω	
R17	220Ω	
R18	100Ω	
R19	12meg 5%	
R20	180K	
R21	1. 5meg	
R22	15K	
R23	3300Ω	
R24	56K	
R25	120K	
R26	1meg	
R27	22K	
R28	5100Ω 7W	#WT14X119 ①
R29	82Ω	
R30	12K	②

ITEM No.	RATING	REMARKS
R31	220K	
R32	47K	
R33	3. 3meg	
R34	680K	
R35	1meg	
R36	10K	
R37	4700Ω	
R38	33K 1W	
R39	330Ω	(680Ω)*
R40	68K	①
R41	330K	④
R42	22Ω	
R43	100Ω	
R44	6. 8meg	
R45	680K	
R46	470K 5%	
R47	1000Ω	
R48	470K 5%	
R49	680Ω 2W	
R50	47K	
R51	68K	
R52	150K	
R53	820K	
R54	1. 8meg	

ITEM No.	RATING	REMARKS
R55	56K 1W	
R56	15K	
R57	1meg	
R58	1000Ω	
R59	1000Ω	
R60	15K	
R61	560K	
R62	390K	
R63	1. 5meg	
R64	56K	
R65	15K 5% 1W	
R66	1meg	
R67	62K 5%	
R68	33K	
R69	43K 5%	
R70	12K	
R71	620Ω 5%	
R72	820K	
R73	470Ω	
R74	100Ω	
R75	12K 2W	
R76	2200Ω	
R77	470K	

* Alternate value. # G E Part Number.
① 17" versions use 5600Ω 7W in this application (Part #WT14X116).
② 17" versions use 15K or 18K in this application.
③ Not used in some versions.
④ Not used in 17" versions.

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	G E PART No	REPLACEMENT DATA
K1	De-Emphasis Network	1300mmf, 2000mmf, 5000mmf, 47K	WT33X29	
K2	Ratio Detector Load	800mmf, 22K	WT24X3 ①	Sprague PRC-4
K3	Sync Coupling	47mmf, 470K	WT24X3	Centralab RC-465 Sprague PRC-3
K4	Vert. Integrator	150mmf, 800mmf, 3300mmf, 22K, 66K, 88K, 100K	WT33X29	

① 17" versions use individual components in this application.

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: G E PART No.	Gromer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	NOTES
L1	47.25MC Trap	WT36X379						
L2	RF Choke	WT36X377						
L3	1st Video IF	WT36X378						
L4	2nd Video IF	WT61X99						①
L5	3rd Video IF	WT61X100						③
L6	4th Video IF	WT36X382						
L7	RF Choke	WT36X381	19-1000	19-1000	BC-561	4602		1uh
L8	RF Choke	WT36X386	19-3003	19-3003		4594		.22uh
L9	Series Peaking Coil	WT36X400						31uh
L10	RF Choke	WT36X401	19-1005	19-1005	BC-566	4612		10uh
L11	RF Choke	WT36X444						7. 5uh
L12	Series Peaking Coil	WT36X396						82uh
L13	Shunt Peaking Coil	WT36X384	19-3375	19-3375	TV-201	6134		390uh
L14A	Sound Take-off Coil	WT36X405						
B	4.5MC Trap							
L15	Shunt Peaking Coil	WT36X261	19-3680	19-3680	TV-206	6148		680uh ③
L16	Series Peaking Coil	WT36X375	19-3500	19-3500	TV-199	6155		300uh
L17	Ratio Detector	WT36X448						
L18	RF Choke	WT36X106	19-1005	19-1005	BC-566	4612		10uh
L19	RF Choke	WT36X106	19-1005	19-1005	BC-566	4612		10uh

① Alternate Part #WT61X104.
② Alternate Part #WT61X105.
③ 17" versions use 820uh in this application (Part #WT36X284).

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: G E PART No	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No	NOTES
L20	80Ω		WT36X402						Horiz. Stab.

COILS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA: G E PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Rogers PART No.	Stancor PART No	Thordarson PART No.	Triad PART No.
L21	Width Choke (.6mh tap @ .07mh)	WT36X409								

FILTER CHOKE

ITEM No.	RATINGS: CURRENT (Measured)	RATINGS: DC RES.	RATINGS: INDUCTANCE (0 CURRENT 1000 ~)	REPLACEMENT DATA: G E PART No.	Halldorson PART No.	Merit PART No.	Ram PART No	Stancor PART No	Thordarson PART No.	Triad PART No.
L22	240A	85Ω	1. 2 Hy.	WT63X56	26C44 ①	C-2996 ①	F-803 ①	C-2328①	26C44 ①	C-17X ①

① Drill new mounting holes.

TRANSFORMER (POWER)

ITEM No	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	REPLACEMENT DATA: G E PART No	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ 1. 8A	580VCT @ 240A	5V @ 3A	WT86X39 ①						R-75BA
	SEC. 3	SEC. 4	SEC. 5							
	6. 3V @ 8. 4A									

① WT86X41 used in Models with power tuning.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: G E PART No	Halldorson PART No	Merit PART No	Ram PART No	Rogers PART No	Stancor PART No	Thordarson PART No	Triad PART No
T2	Vert. Output	WT64X69	26878 ①③	A-3087	V813		VO-101 ①	26878 ①②	A-156X
T3	Yoke-Horiz. (12MH) (10°)-Vert. (39MH)	WT76X28	Y-81 ④					Y-81 ④	Y-70 & MW-1
	Centering Ring Assy.	WT42X35							
	Yoke Clamp Assy.	WT9X37							
	Horiz. Output	WT7X43							
T4									

① Connect as autoformer.
② Use 15 to 1 turns ratio.
③ Drill new mounting hole(s).
④ Connect same as original. Use original vertical yoke damping resistors, if necessary.

+ WT 76X31

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA: G E PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T5	4800Ω	3-4Ω	WT64X75 ①	26849	A-3019	AU-604	A-8092	26849	S-8X	① 17" versions use Part #WT64X74.

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: G E PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	WT95X6 ①	4AIR	① Models 21T3417, 3418, 3419, 3420, 3421, 3425, 3435UHF, 3436UHF, 21C3439
	8"	PM		WT95X7 ②		② Models 21C3440, 3441, 3445, 3446, 3458, 3459, 3462, [illegible]
	4"	PM		WT95X21 ③		③ 17" Models
	4" x 8"	PM		WT95X22 ④		④ Models 21T3429, 3430, 3431, 3432, 3435VHF, 3436VHF, 3442, 21K3443, 3478, 3479
	4"	PM		WT95X23 ⑤		⑤ Models 21C3445, 3446
	9" x 21"	PM		WT95X25 ⑥		⑥ Models 21C3450, 3451, 3460, 3461, 21L3455, 3456

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: G E PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No	NOTES
M1		WT16X7 ①	1T1 ①②	K1615 ①			① Selenium type. ② Two Required.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA: G E PART No. FUSE	G E PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	N	3.5A 125V 8/B	WT10X26	WT8X64	3303.5 (N 3)à 125V 8/B)	346016	N 3½	HN 3½ to 3½
M3	3AG	.375A 125V 8/B P/T	WT10X11		315.375 (3AG . 375A 8/B P/T)		MDV 3/8	
M4		1½" Length of #26 Wire						

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA: G E PART No.	CBS PART No	RAYTHEON PART No.	SYLVANIA PART No.	NOTES
M5	1N64	WT18X1	1N64	1N295	1N295	Video Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	G E PART No.	NOTES
M6	Tuner	WT86X80	VHF
	Tuner	WT86X82	VHF
	Tuner	WT86X81	VHF with UHF provisions
	Tuner	WT85X25	UHF
M7	Switch	WT93X5	Width
	Magnet	WT42X31	Beam Alignment (Used with some picture tubes)
	Printed Board	WT93X37	Video Detector Assy.
	Antenna	WT83X9	VHF, Retractable, Model 17T3320
	Antenna	WT83X12	VHF, Retractable, Models 21T3429, 3430, 3431, 3432
	Antenna	WT83X14	VHF, Retractable, Models 17T3321, 21T3435, 3436
	Antenna	WT83X16	VHF, Retractable, Model 17T3318
	Antenna	WT83X19	VHF, Retractable, Models 17T3311, 3315, 3316, 3317
	Antenna	WT83X20	VHF, Retractable, Model 17T3331U
	Antenna	WT83X18	UHF Loop Assy., Models 21T3429, 3430, 3431, 3432, 21C3445, 3446, 3450, 3451, 3460, 3461
	Antenna	WT85X8	UHF Loop Assy., Models 17T3331U, 21T3417, 3418, 3419, 3420, 3421, 3425, 3435, 21C3439, 3440, 3441, 3442, 3443, 3458, 3459, 3478, 3479, 3482, 3483

GENERAL ELECTRIC "MA5" LINE

FOLDER 1

PARTS LIST AND DESCRIPTIONS (Continued)

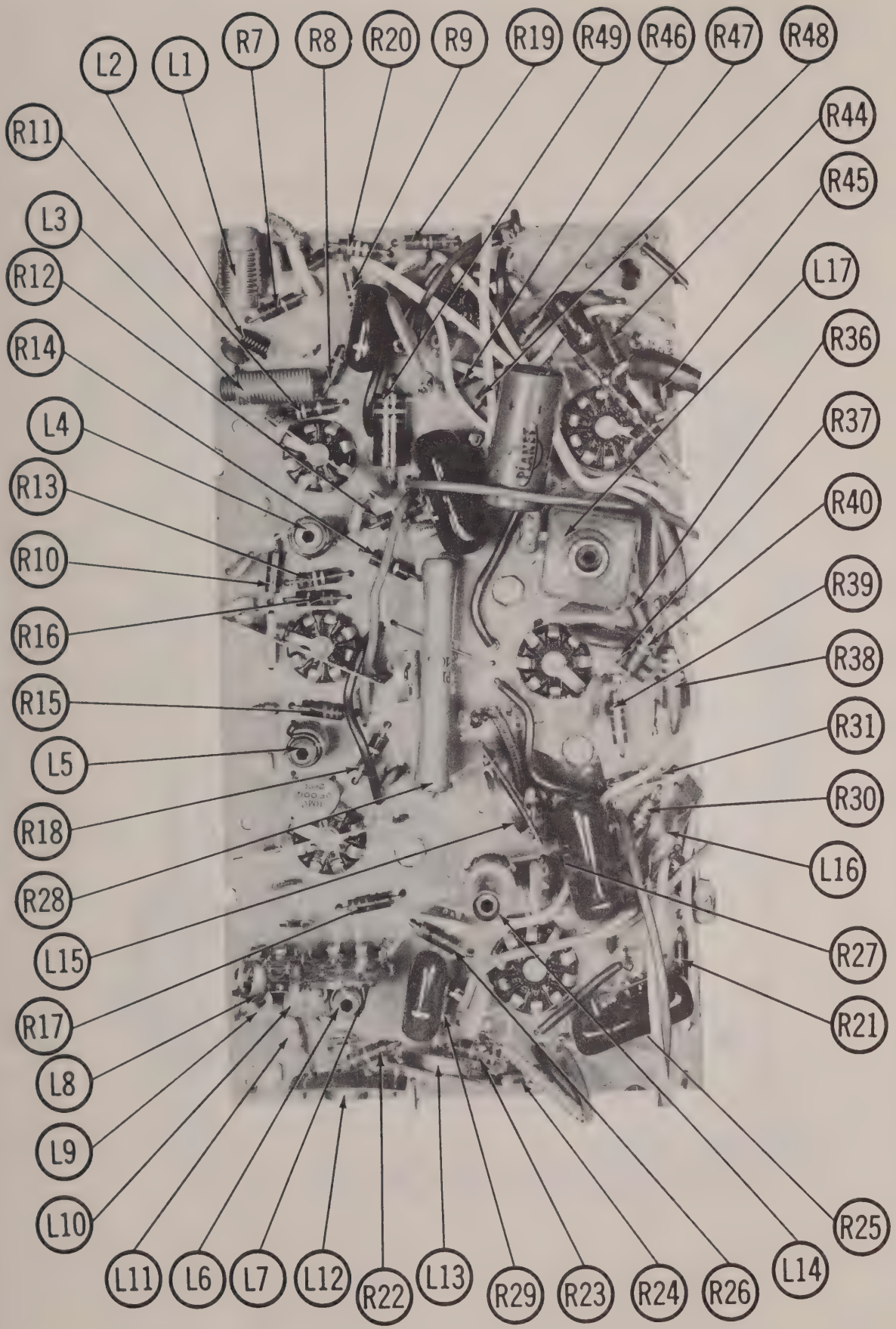
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

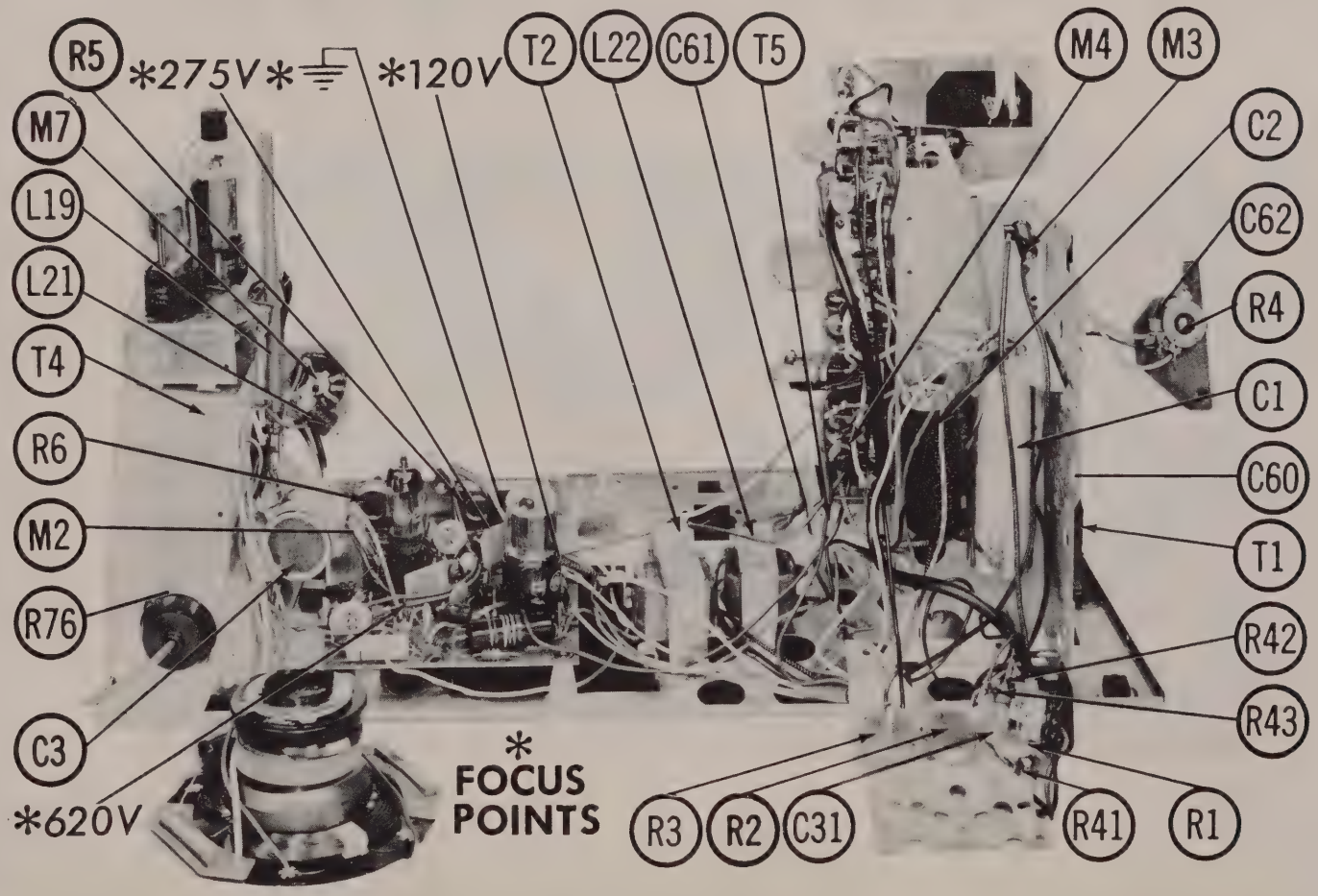
NAME	PART NO.	DESCRIPTION
Safety Glass	WT94X77	Models 21T3418, 19, 20, 21, 25, 21C3440, 41, 42, 43, 45, 46, 50, 51, 58, 59, 60, 61, 78, 79, 82, 83, 21L3455, 56
Safety Glass	WT94X79	Models 21T3417, 39
Safety Glass	WT94X81	Models 21T3429, 30, 31, 32, 35, 36
Safety Glass	WT94X82	Model 17T3331UHF
Safety Glass	WT94X83	All 17" Models except 17T3331UHF
Mask	WT96X51	Models 21T3417, 18, 19, 21C3439, 40, 41, 78, 79
Mask	WT96X52	Models 21T3420, 21, 25, 21C3442, 43, 45, 46, 21L3455, 56, 21C3450, 51, 58, 59, 60, 61, 82, 83
Mask	WT96X54	Models 21T3435, 36
Knob	WT43X295	VHF Channel Selector, Black (Gold Insert), All 17" Models except 17T3331UHF
Knob	WT43X299	VHF Channel Selector, Clear (Gold Insert), Models 21T3417, 18, 19, 20, 21, 29, 30, 31, 32, 21C3439, 40, 41, 45, 46, 50, 51, 78, 79, 82, 83
Knob	WT43X301	VHF Channel Selector, Gold, Models 17T3331UHF, 21T3435, 36, 21C3442, 43, 21L3455, 56
Knob	WT43X289	UHF Channel Selector, Clear (Gold Insert)
Knob	WT43X183	VHF Fine Tuning, Clear, All 17" Models except 17T3331UHF
Knob	WT43X300	VHF Fine Tuning, Clear, Models 21T3417, 18, 19, 20, 21, 29, 30, 31, 32, 21C3439, 40, 41, 45, 46, 50, 51, 78, 79, 82, 83
Knob	WT43X304	VHF Fine Tuning, Clear, Models 17T3331UHF, 21T3435, 36, 21C3442, 43, 21L3455, 56
Knob	WT43X286	UHF Indicator, Black
Knob	WT43X308	Off-On-Volume, Vertical Hold, Black, Models 17T3304, 05, 06
Knob	WT43X303	Off-On-Volume, Vertical Hold, Gold, Models 17T3331UHF, 21T3435, 36, 21C3442, 43, 21L3455, 56
Knob	WT43X298	Off-On-Volume, Vertical Hold, Black (Gold Insert), Models 17T3310, 11, 15, 16, 17, 18, 20, 21, 21T3417, 18, 19, 20, 21, 25, 29, 30, 31, 32, 21C3439, 40, 41, 45, 46, 50, 51, 58, 59, 60, 61, 78, 79, 82, 83
Knob	WT43X297	Brightness, Clear
Knob	WT43X296	Contrast, Black (Gold Insert), Models 17T3310, 11, 15, 16, 17, 18, 20, 21, 21T3417, 18, 19, 20, 21, 25, 29, 30, 31, 32, 21C3439, 40, 41, 45, 46, 50, 51, 58, 59, 60, 61, 78, 79, 82, 83
Knob	WT43X302	Contrast, Gold, 17T3331UHF, 21T3435, 36, 21C3442, 43, 21L3455, 56
Knob	WT43X307	Contrast, Black, Models 17T3304, 05, 06
Cabinet	WT103X213	Model 17T3310
Cabinet	WT103X214	Model 17T3315
Cabinet	WT103X215	Model 17T3316
Cabinet	WT103X216	Model 17T3320
Cabinet	WT103X218	Model 21T3430
Cabinet	WT103X219	Model 21T3431
Cabinet	WT103X221	Model 17T3321
Cabinet	WT103X222	Models 21T3417, 18
Cabinet	WT103X223	Model 21T3419
Cabinet	WT103X224	Models 21T3420, 25
Cabinet	WT103X225	Model 21T3421
Cabinet	WT103X226	Models 21C3440, 78
Cabinet	WT103X227	Models 21C3441, 79
Cabinet	WT103X228	Models 21C3445, 60
Cabinet	WT103X229	Models 21C3446, 61
Cabinet	WT103X230	Model 21C3450
Cabinet	WT103X232	Model 17T3331UHF
Cabinet	WT103X234	Models 17T3304, 05
Cabinet	WT103X235	Model 21C3451
Cabinet	WT103X236	Model 21C3458
Cabinet	WT103X237	Model 21C3459
Cabinet	WT103X238	Model 21T3432
Cabinet	WT103X242	Model 21C3442
Cabinet	WT103X243	Model 21C3443
Cabinet	WT103X244	Less Hood & Legs, Model 21T3435
Cabinet	WT103X245	Less Hood & Legs, Model 21T3436
Cabinet	WT103X246	Model 21T3429
Cabinet	WT103X247	Model 17T3311
Cabinet	WT103X248	Model 17T3317
Cabinet	WT103X249	Model 17T3306
Cabinet	WT103X250	Model 21L3455
Cabinet	WT103X251	Model 21L3456
Cabinet	WT103X252	Model 21C3482
Cabinet	WT103X253	Model 21C3483
Cabinet	WT103X255	Model 21C3479
Cabinet	WT103X257	Model 17T3318
Leg	WT78X64	Models 21C3439, 40, 58, 78, 82
Leg	WT78X85	Models 21T3436, 35
Leg	WT78X65	Models 21C3441, 59, 79
Leg	WT78X77	Model 21C3442
Leg	WT78X78	Model 21C3443
Leg	WT78X79	Model 21C3483
Handle	WT78X71	Model 17T3321
Handle	WT78X72	Model 17T3320
Handle	WT78X81	Models 21T3429, 30, 31, 32
Handle	WT78X86	Model 17T3318

WIRING DATA

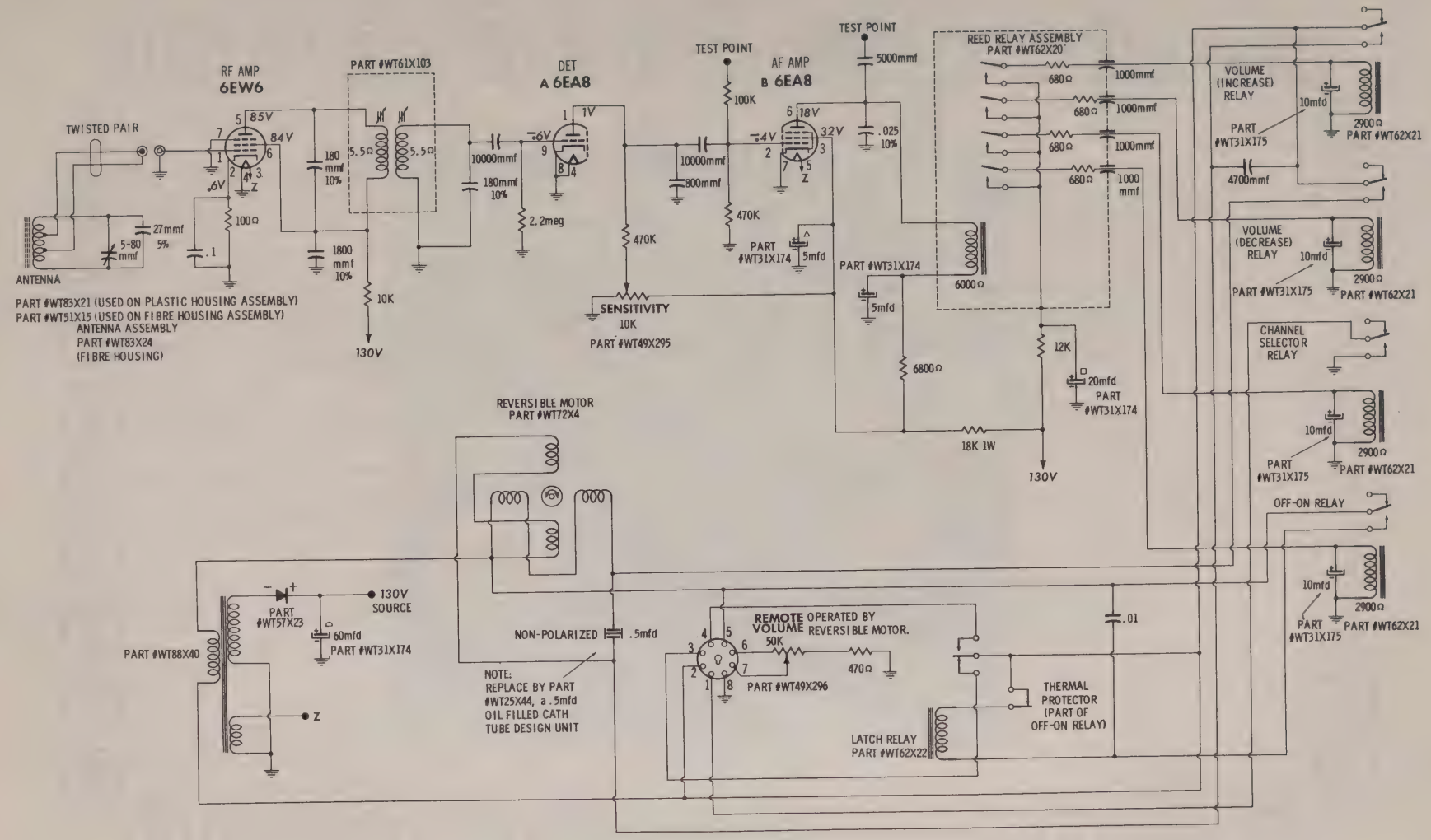
High Voltage Lead	Use BELDEN No.	8869
Shielded Hook-up Wire	Use BELDEN No.	8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No.	8874
300Ω Tuner Input Lead	Use BELDEN No.	8225
300Ω Antenna Lead-in	Use BELDEN No.	8230 or 8275
Antenna Rotor Cable	Use BELDEN No.	8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor



MAIN PRINTED BOARD - RESISTOR & INDUCTOR IDENTIFICATION



CHASSIS - FRONT VIEW



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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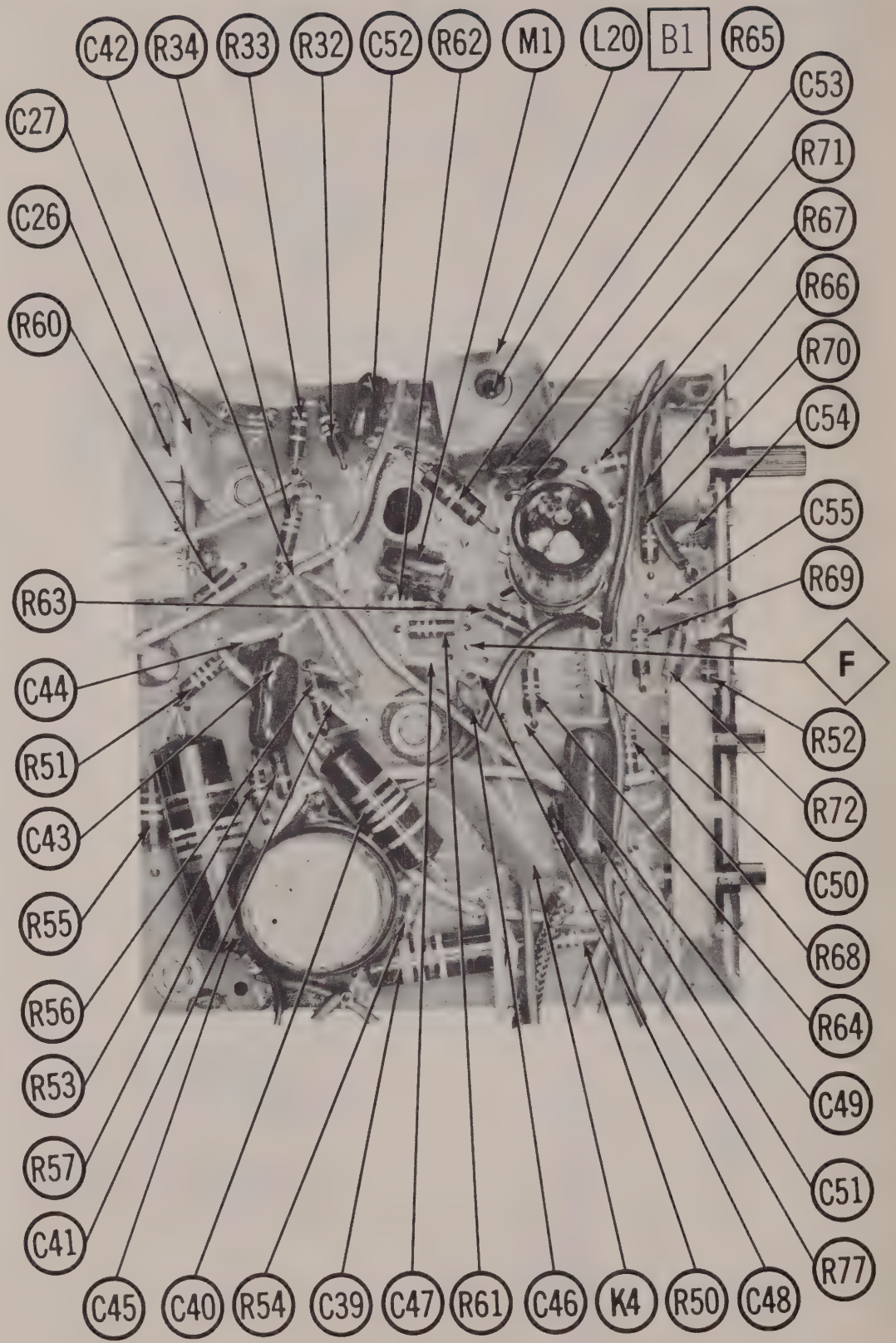
REMOTE CONTROL RECEIVER

GENERAL ELECTRIC
"M5" LINE



SWEEP PRINTED BOARD

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS FOR TUNERS WT86X80 & WT86X81

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: A201.....GENERAL CEMENT #8721, 8722
WALSCO # 2519

VHF OSCILLATOR ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the Fine Tuning to the center of its range.
Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Preset A201 at center of its range. Replace tuner cover each time to observe response on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across VHF Antenna terminals thru matching network (Fig. 201).	213MC	211.25MC	13	Vert. Amp. thru 10K across Video Detector load	A202,	Adjust to place Video marker at 50% on response curve as shown in Fig. 202.
			207MC	205.25MC	12		A203,	
			201MC	199.25MC	11		A204,	
			195MC	193.25MC	10		A205,	
			189MC	187.25MC	9		A206,	
			183MC	181.25MC	8		A207,	
			177MC	175.25MC	7		A208,	
			85MC	83.25MC	6		A209,	
			79MC	77.25MC	5		A210,	
			69MC	67.25MC	4		A211,	
			63MC	61.25MC	3		A212,	
			57MC	55.25MC	2		A213	

VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Disconnect IF link from IF strip and terminate with a 68 ohm resistor at open end only. Tuner cover must be in place when observing response on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Fig. 201	Across FM antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (U). Low side to chassis.	A214, A215, A216, A217	Adjust in numerical order for maximum gain and symmetry of response similar to Fig. 203. A214 controls marker position. A215 controls tilt, A216 and A217 controls gain.
3.	"	"	207MC	205.25MC 209.75MC	12	"	A218, A219, A220	Adjust in numerical order for response similar to Fig. 203. Adjust first coil for proper marker position, second coil for proper tilt and third coil for maximum gain.
4.	"	"	201MC	199.25MC 203.75MC	11	"	A221, A222, A223	"
5.	"	"	195MC	193.25MC 197.75MC	10	"	A224, A225, A226	"
6.	"	"	189MC	187.25MC 191.75MC	9	"	A227, A228, A229	"
7.	"	"	183MC	181.25MC 185.75MC	8	"	A230, A231, A232	"
8.	"	"	177MC	175.25MC 179.75MC	7	"	A233, A234, A235	"
9.	"	"	85MC	83.25MC 87.75MC	6	"	A236, A237, A238	"
10.	"	"	79MC	77.25MC 81.75MC	5	"	A239, A240, A241	"
11.	"	"	69MC	67.25MC 71.75MC	4	"	A242, A243, A244	"
12.	"	"	63MC	61.25MC 65.75MC	3	"	A245, A246, A247	"
13.	"	"	57MC	55.25MC 59.75MC	2	"	A248, A249, A250	"

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS FOR TUNER #WT86X82

The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the Fine Tuning to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Tuner cover must be in place when observing response curve on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across VHF antenna terminals thru matching network (Fig. 201).	213MC	211.25MC	13	Vert. Amp. thru 10K across Video Det. load.	A202	Adjust to place Video marker at 50% on response curve as in Fig. 202.
			207MC	205.25MC	12		A203	
			201MC	199.25MC	11		A204	
			195MC	193.25MC	10		A205	
			189MC	187.25MC	9		A206	
			183MC	181.25MC	8		A207	
			177MC	175.25MC	7		A208	
			85MC	83.25MC	6		A209	
			79MC	77.25MC	5		A210	
			69MC	67.25MC	4		A211	
			63MC	61.25MC	3		A212	
			57MC	55.25MC	2		A213	

VHF RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.
Disconnect IF link from Video IF strip and terminate open end with a 68Ω resistor. Tuner cover must be in place when observing response curve on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
2.	Fig. 201	Across VHF antenna terminals thru matching network.	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (U). Low side to chassis.	A214, A215, A216, A217, A218	Adjust A214, A215 and A216 for maximum gain and symmetry of response similar to Fig. 203. Adjust A217 (gimmick) for proper bandwidth. If dip is excessive, adjust A218.
3.	"	"	177MC	175.25MC 179.75MC	7	"	A219, A220, A221	Adjust A219 and A220 for maximum gain and symmetry of response similar to Fig. 203. Adjust A221 (gimmick) for proper bandwidth.
4.	"	"	207MC	205.25MC 209.75MC	12	"		Check for response similar to Fig. 203. If necessary, make compromise adjustment of A219 and A220 best response on all channels.
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
5.	"	"	85MC	83.25MC 87.75MC	6	"	A222, A223, A224	Adjust for maximum gain and symmetry of response similar to Fig. 203 with markers as shown.
6.	"	"	79MC	77.25MC 81.75MC	5	"	A225, A226, A227	"
7.	"	"	69MC	67.25MC 71.75MC	4	"	A228, A229, A230	"
8.	"	"	63MC	61.25MC 65.75MC	3	"	A231, A232, A233	"
9.	"	"	57MC	55.25MC 59.75MC	2	"	A234, A235, A236	"

TUNER ALIGNMENT INSTRUCTIONS (Con't)

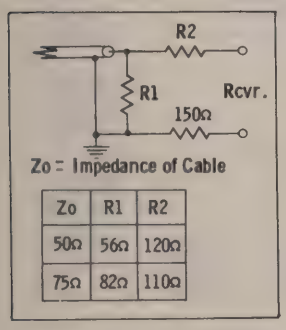
UHF IF ALIGNMENT

Disconnect IF link from Video IF strip and terminate open end with a 68Ω resistor.
Connect the negative lead of a 3 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
14.	120Ω Carbon Resistor	High side thru 120Ω to point (V). Low side to chassis.	42MC	40.5MC 45.75MC	UHF	Vert. Amp. thru 10K to point (U). Low side to chassis.	A251, A252, A253	Adjust for maximum gain and symmetry of response similar to Fig. 204. Adjust A251 to position 40.5MC marker, A252 to position 45.75MC marker and A253 for maximum gain and zero tilt.

UHF TUNER ALIGNMENT

This portion of the tuner has been properly aligned at the factory and is very stable. Alignment of this portion should not be attempted in the field.



Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 201

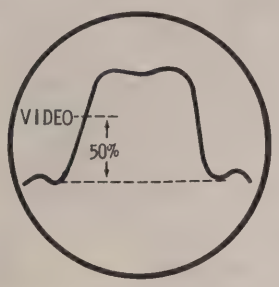


FIG. 202

FIG. 203

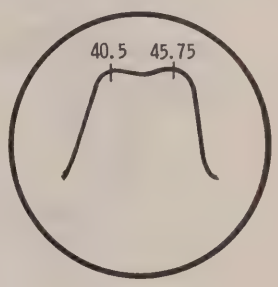
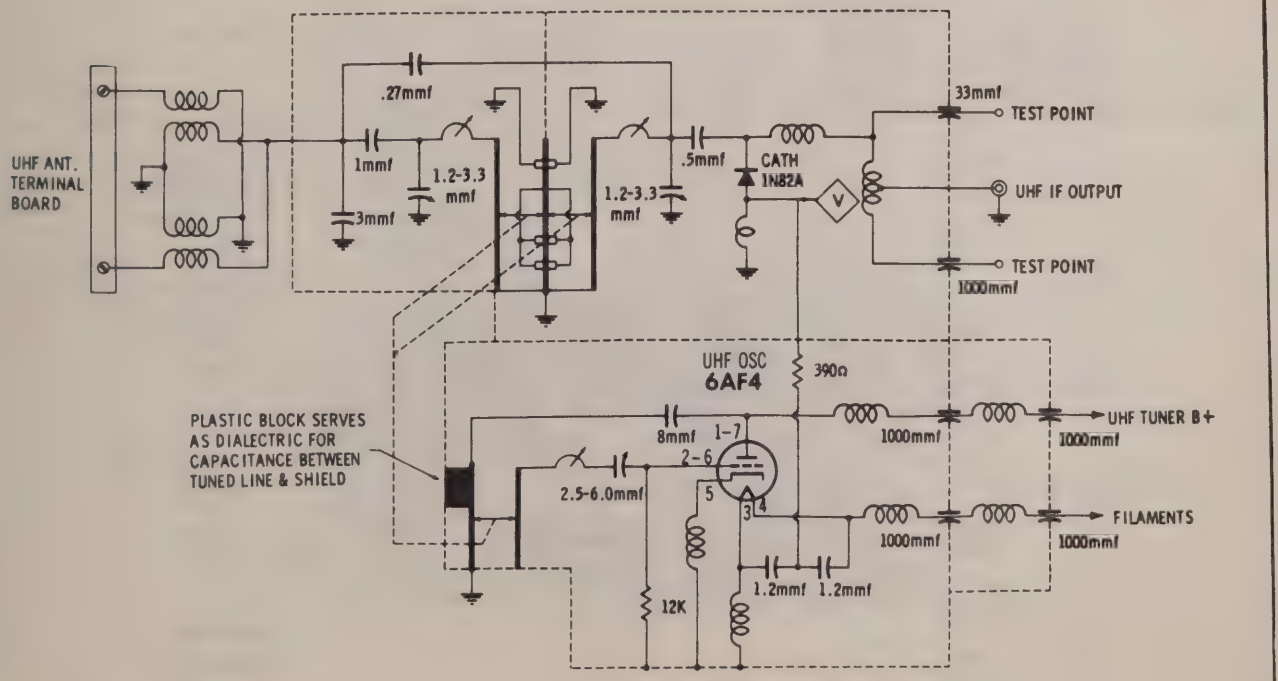


FIG. 204



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UHF TUNER WT85X25

TUNER PARTS LIST AND DESCRIPTIONS
WT 86X80

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V201	RF Amplifier	6CY5	V202	Mixer-Osc.	6CL8A

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C201	15 NPO 10%	#WT23X16				CCTO-150		
C202	1000		EF-001	MFT-1000		CCF-102	CT250	
C203	5 NPO 10%		NPO-DI 5	DTZ-4R7	C10V5C	CCTO-050	CNO-547	10TCC-V50
C204	.39 10%	#WT21X27						
C205	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C206	.68 10%	#WT21X10	NPO-SI .68	TCZ-R68				
C207	.91 10%		NPO-SI 1.0	TCZ-1			CNO-510	10TCC-V10
C208	1.3 10%		NPO-SI 1.5	TCZ-1R5	C10V15C		CNO-515	10TCC-V15
C209	47 N750 5%		NPO-DI 47	DTN-47	C10Q47C	CCDN-470-10%	CN7-447	10TCU-Q47
C210	1.5 N3300 ±1mmf	#WT23X21						
C211	30 NPO 5%		NPO-SI 30	TCZ-30	C10Q3C	CCTO-300		10TCC-Q30
C212	1.8 10%		NPO-SI 2.0		C10V2C			10TCC-V18
C213	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C214	1.5 N750 ±.5mmf	#WT23X14						
C215	10 N470 ±.5mmf	#WT18X407						
C216	.6-1.2	#WT30X50		829-3				
C217	1000		EF-001	MFT-1000		CCF-102	CT254A	
C218	1000		EF-001	MFT-1000		CCF-102	CT254A	
C219	1000		EF-001	MFT-1000		CCF-102	CT254A	
C220	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C221	1000		EF-001	MFT-1000		CCF-102	CT254A	
C222		#WT5X29						
C223			EF-001	MFT-1000		CCF-102	CT25YA	

GE Part Number.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R201	12K	
R202	22K	
R203	10K	

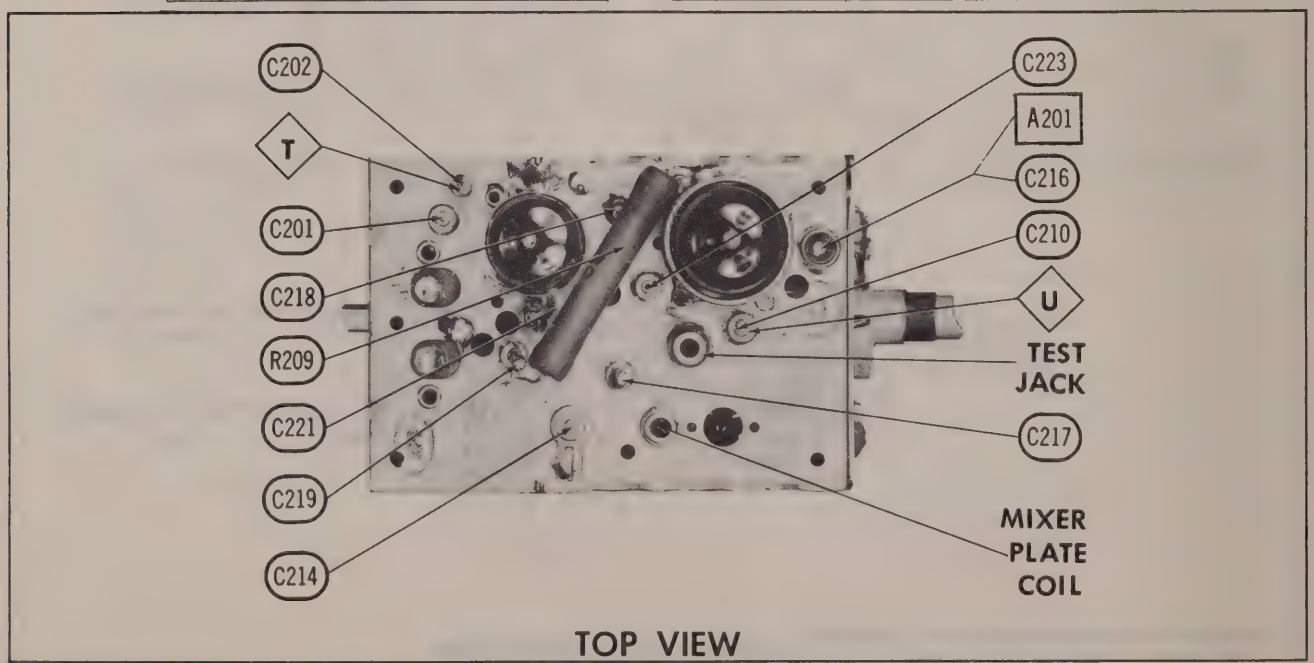
ITEM No.	RATING	REMARKS
R204	10K	
R205	220K	
R206	15K	

ITEM No.	RATING	REMARKS
R207	22K	
R208	10K	
R209	12K 5W	

COILS (RF-IF)

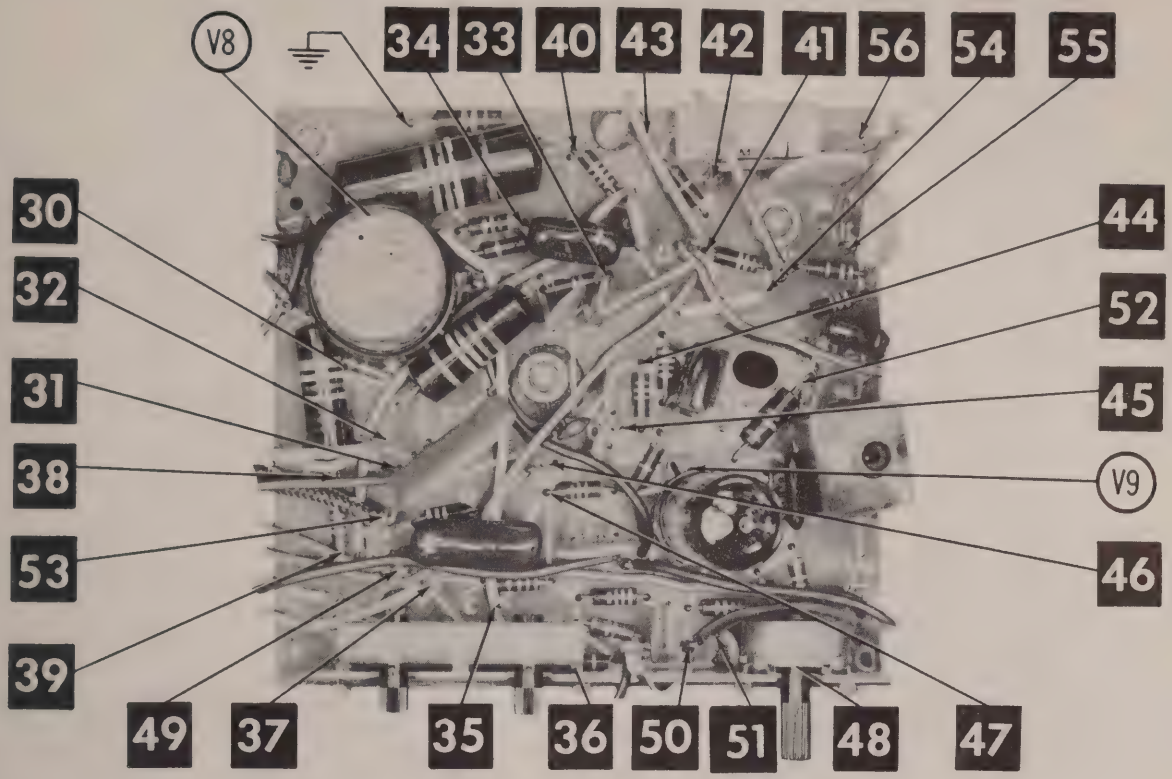
ITEM No.	USE	G. E. PART No.	NOTES
L201	Ant. Trans.	WT37X25	
L202	Ant. Coils	WT52X123	Includes wafer
L203	RF Coils	WT52X124	Includes wafer
L204	Mixer Grid Coils	WT52X125	Includes wafer

ITEM No.	USE	G. E. PART No.	NOTES
L205	Osc. Coils	WT52X142	Includes wafer
L206	RF Choke	WT36X408	
L207	Mixer Plate Coil	WT36X289	



TOP VIEW

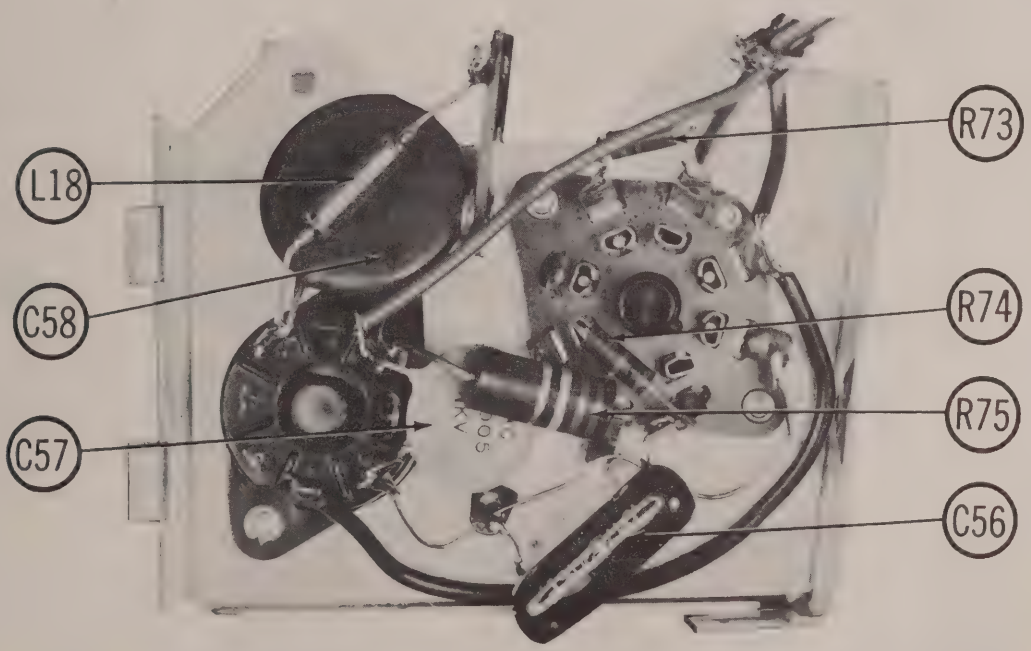
CircuiTrace Numbers 30 thru 56



A Howard W. Sams CIRCUITRACE* Photo

SWEEP
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED

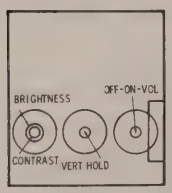


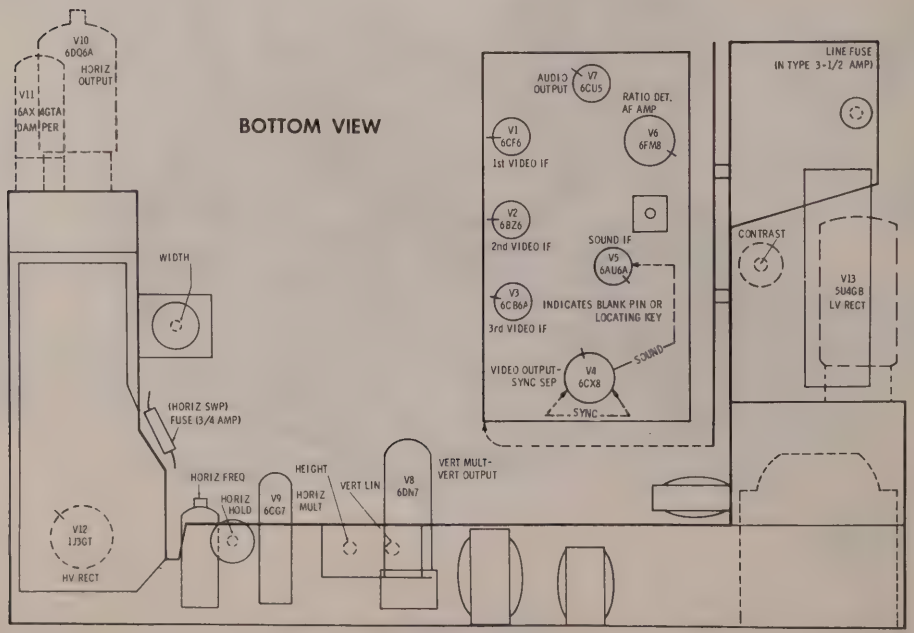
SWEEP SUB-CHASSIS

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6CF6	515K	47Ω	.1Ω	0Ω	▲100Ω	▲100Ω	0Ω		
V2	6BZ6	▲22K	▲22Ω	.1Ω	0Ω	†220Ω	†220Ω	100K		
V3	6CB6A	.1Ω	150Ω	.1Ω	0Ω	■ 220Ω	■ 220Ω	0Ω		
V4	6CX8	0Ω	1.7meg	■18K	.1Ω	0Ω	82Ω	1meg	■0Ω	†4500Ω
V5	6AU6A	3.3Ω	0Ω	.1Ω	0Ω	■ 10K	■ 38K	330Ω		
V6	6FM8	INF	INF	22K	0Ω	.1Ω	0Ω	0Ω	6.8meg	†680K
V7	6CU5	¶	270K	.1Ω	0Ω	270K	†680Ω	†945Ω		
V8	6DN7	• 2.2meg	†260Ω	0Ω	• 1.3meg	• †3.3meg	0Ω	.1Ω	0Ω	
V9	6CG7	†15K	2.5meg	820Ω	.1Ω	0Ω	†76K	60K	820Ω	0Ω
V10	6DQ6A	TP	0Ω	NC	†12K	820K	TP	.1Ω	0Ω	TOP CAP †25Ω
V11	6AX4GTA	NC	NC	¶1meg	NC	†0Ω	NC	0Ω	.1Ω	
V12	1J3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP †375Ω
V13	5U4GB	NC	¶	NC	30Ω	NC	32Ω		¶	
V14	21ESP4	.1Ω	NC	†680K	1meg	TP	47K	270K	0Ω	
V201	6CY5	360K	0Ω	0Ω	.1Ω	†12K	■8000Ω	0Ω		
V202	6CL8A	15K	■ 10K	0Ω	0Ω	.1Ω	■ .5Ω	■0Ω	0Ω	230K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 275V SOURCE.
‡ MEASURED FROM PIN 3 OF V11.
▲ MEASURED FROM PIN 7 OF V2.
■ MEASURED FROM 135V SOURCE.
NC NO CONNECTION
TP TIE POINT





TUBE PLACEMENT CHART

The PHOTOFACT Servicer

SET 465 ★ *Published for all users of Howard W. Sams' Photofact Folders* ★ NOV., 1959

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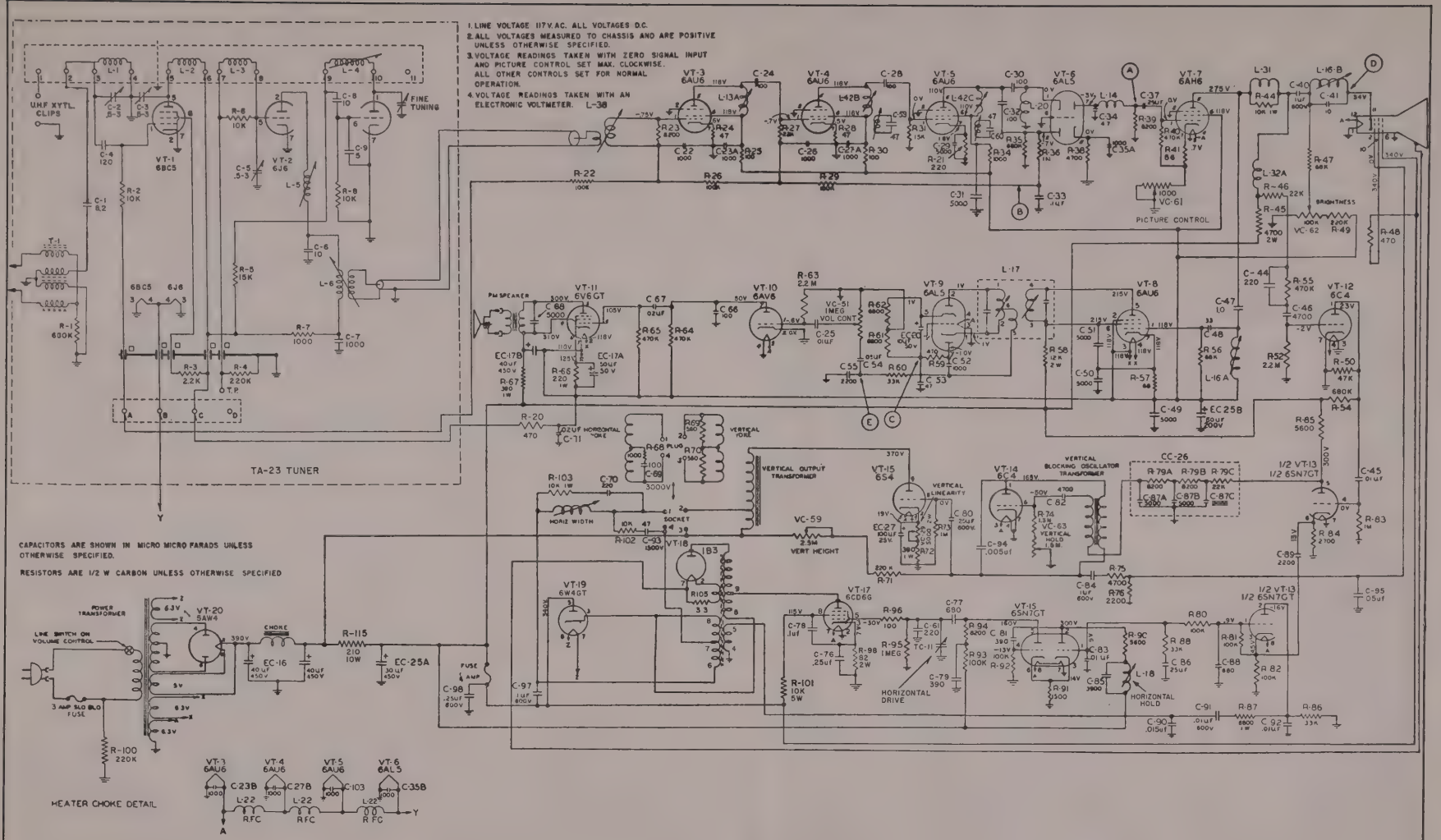
This Servicer provides you with essential data on other models or special equipment not covered in standard PHOTOFACT folders. The schematics and supplementary data included here will be of valuable help to you in servicing this equipment.

IN THIS ISSUE OF THE SERVICER:

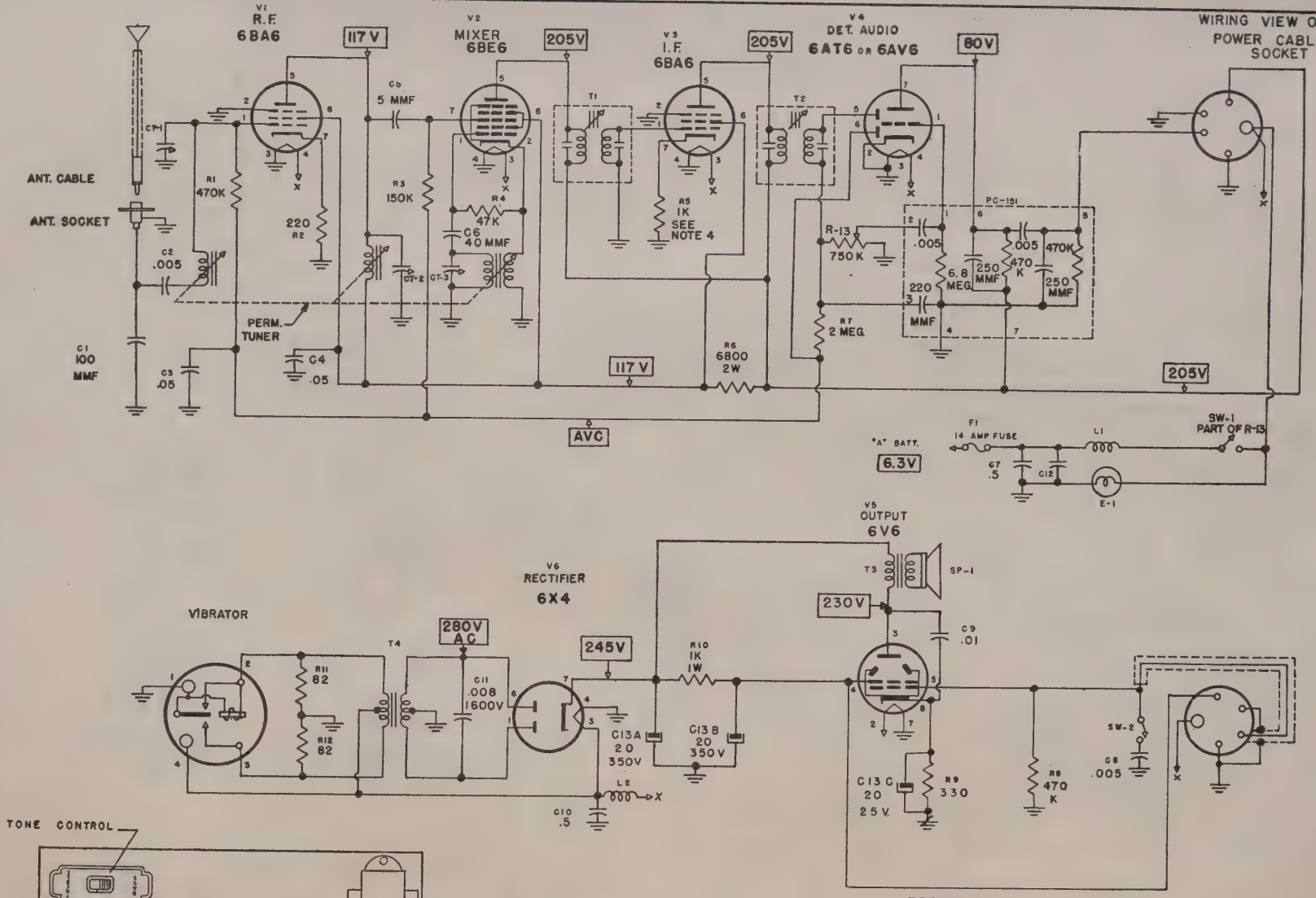
Automatic Model S-154

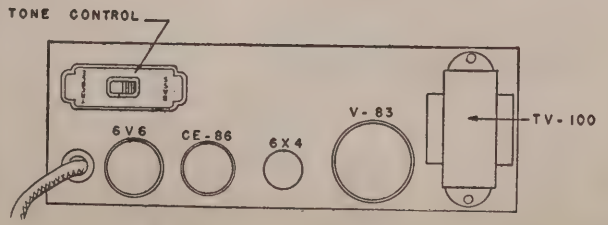
Trav-Ler Model 524-83 (CH. 518B4, 518B5)



TRAV-LER MODEL 524-83 (CH. 518B4, 518B5)

Schematic Diagram Courtesy of Trav-Ler Radio Corporation





Power pack tube locations

NOTES:

1. All condensers are in MFD unless otherwise specified.
2. All Resistors are ½ watt unless otherwise specified.
3. 6AT6 tube used in place of 6AV6 in some models.
4. 1655-6 IF Transformer used on some models; R5 changed to 3K ohms when used with 1655-6 IF Transformer.

AUTOMATIC MODEL S-154

Schematic Diagram Courtesy of Automatic Radio Mfg. Co.

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

WESTINGHOUSE CHASSIS
V-2376-1, V-2376-2

IMPORTANT FILING NOTICE

The TV Folder for this envelope will be found among the first folders in this complete Set of folders.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

WESTINGHOUSE CHASSIS
V-2376-1, V-2376-2

MODEL H-21T302 (Ch. V-2376-1)

WESTINGHOUSE CHASSIS
V-2376-1, V-2376-2

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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DATE 11 – 59

SET 465 FOLDER 2

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

WESTINGHOUSE CHASSIS V-2376-1, V-2376-2

WESTINGHOUSE CHASSIS V-2376-1, V-2376-2

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL MODEL H-21T302

1. Remove 7 wood screws holding the rear cover. Remove the rear cover.
2. Remove 2 push-on type knobs from front.
3. Remove escutcheon which is held by 2 screws inside the cabinet, one in each upper corner and by 3 screws at the front of the cabinet.
4. Remove 5 push-on type knobs now visible.
5. Remove 4 screws holding front control panel.
6. Remove antenna bracket and speaker leads.
7. Remove 6 chassis bolts from bottom of cabinet.
8. Remove chassis.

MODEL H-21T302 (Ch. V-2376-1)

CAUTION

ONE SIDE OF AC LINE CONNECTED TO CHASSIS.

Care should be exercised when connecting test equipment or physically contacting chassis. Isolation devices employed by manufacturer should be checked and properly connected before returning receiver to owner.

TRADE NAME	Westinghouse	MODELS	CHASSIS
		H-21K305, H-21K306, H-21K308, H-21K309, H-21K310, H-21K311, H-21K312, H-21K313, H-21T300, H-21T301, H-21T302, H-21T303, H-21T304	V-2376-1
		H-21KU305, H-21KU306, H-21KU308, H-21KU309, H-21KU310, H-21TU302, H-21TU303, H-21TU304	V-2376-2
MANUFACTURER	Westinghouse Electric Corp., Television & Radio Div., Metuchen, N.J.		
TYPE SET	Television Receiver		
TUBES	VHF-Sixteen, UHF-Seventeen		
POWER SUPPLY	105-120 Volts AC, 60 Cycle	RATING 170 Watts, 1.6 Amp. @ 117 Volts AC	
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)		

SERVICING IN THE FIELD

SAFETY GLASS REMOVAL

Remove 3 screws holding the trim strip at the top edge of the safety glass. Tilt glass out and remove.

FUSE

One fuse is used for horizontal sweep circuit protection. (For location, see "Tube Placement Chart".)

FUSE DEVICE

A 7.5Ω fusible resistor is used for low voltage power supply protection. (For location, see "Tube Placement Chart".)

TUNER OSCILLATOR ADJUSTMENTS

To touch-up the VHF Oscillator, it is necessary to remove the rear cover.

AGC

No provision is made to vary the AGC on this receiver.

SYNC STABILITY

Sync stability may be varied by means of a Sync control. (For location, see "Tube Placement Chart".)

HORIZONTAL OSCILLATOR FIELD ADJUSTMENTS

Coarse adjustment of the Horizontal Hold is accomplished by the proper setting of the Horizontal Mult. Trimmer and Horizontal Frequency slug. (For location, see "Tube Placement Chart".)

BUZZ ADJUSTMENT

To eliminate intercarrier buzz, adjust the Quieting control for MINIMUM buzz and maximum sound. (For location, see "Tube Placement Chart".)

CENTERING

Centering is accomplished by 2 magnetic rings, located behind the yoke, on the neck of the picture tube.

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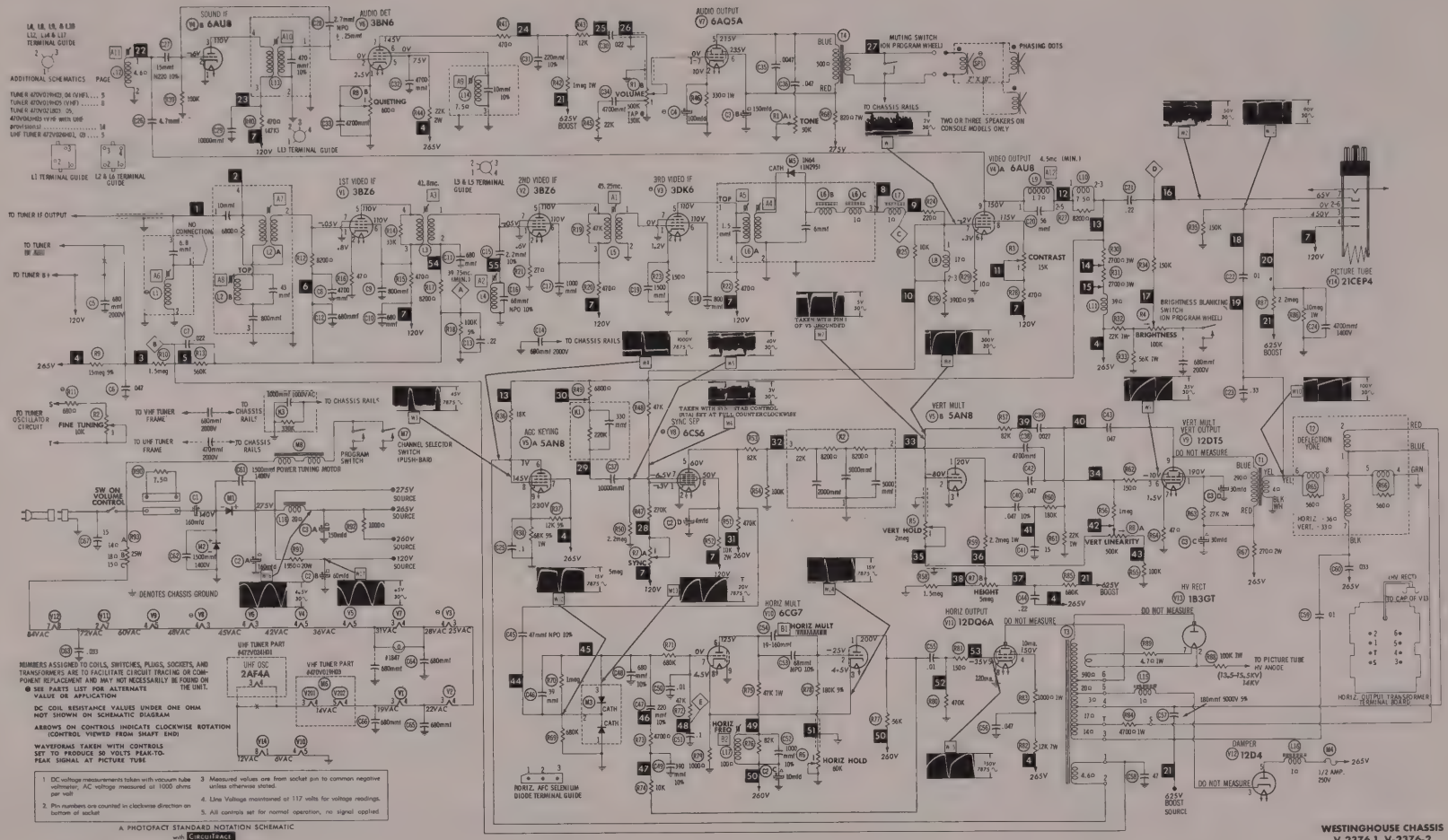
JA610

SET 465 FOLDER 2


SOUND IF V4 6AU8
AUDIO DET V5 3BN6
AUDIO OUTPUT V7 6AQ5A
MUTING SWITCH (ON PROGRAM WHEEL)
PHASING DOTS
TO CHASSIS RAILS
TWO OR THREE SPEAKERS ON CONSOLE MODELS ONLY
VOLUME
TONE
QUIETING
BLUE
RED
120V L1 TERMINAL GUIDE
L1 TERMINAL GUIDE
L2 & L4 TERMINAL GUIDE
L3 & L5 TERMINAL GUIDE
1ST VIDEO IF V1 3BZ6
2ND VIDEO IF V2 3BZ6
3RD VIDEO IF V3 3DK6
VIDEO OUTPUT V4 6AU8
TO TUNER IF OUTPUT
TO TUNER 'B+'
NO CONNECTION
TOP
CONTRAST
BRIGHTNESS
BRIGHTNESS BLANKING SWITCH (ON PROGRAM WHEEL)
PICTURE TUBE V14 21CEP4
625V BOOST
TAKEN WITH PIN 7 OF V5 GROUNDED
TO TUNER OSCILLATOR CIRCUIT
FINE TUNING
TO VHF TUNER FRAME
TO UHF TUNER FRAME
CHANNEL SELECTOR SWITCH (PUSH-BAR)
PROGRAM SWITCH
SW ON VOLUME CONTROL
POWER TUNING MOTOR
275V SOURCE
265V SOURCE
260V SOURCE
120V SOURCE
DENOTES CHASSIS GROUND
AGC KEYING V5A 5AN8
SYNC SEP V6B 6CS6
VERT MULT V5B 5AN8
VERT MULT VERT OUTPUT V9 12DT5
DO NOT MEASURE
VERT HOLD
HEIGHT
VERT LINEARITY
DEFLECTION YOKE
HORIZ - 360
VERT. - 330
HV RECT V13 1B3GT
TO CAP OF V13
HORIZ MULT V10 6CG7
HORIZ OUTPUT V11 12DQ6A
TO PICTURE TUBE HV ANODE (13.5-15.5KV) 14KV
HORIZ. OUTPUT TRANSFORMER TERMINAL BOARD
HORIZ. HOLD
HORIZ FREQ
DAMPER V12 12D4
1/2 AMP. 250V
HORIZ. AFC SELENIUM DIODE TERMINAL GUIDE
UHF OSC 2AF4A
UHF TUNER PART 847Y0048R1
VHF TUNER PART 847Y0019R3
12VAC
6VAC
64VAC
72VAC
60VAC
48VAC
45VAC
42VAC
36VAC
31VAC
28VAC
25VAC
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVEFORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1000 ohms per volt
2. Pin numbers are counted in clockwise direction on bottom of socket
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line Voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.
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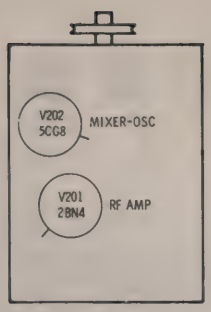
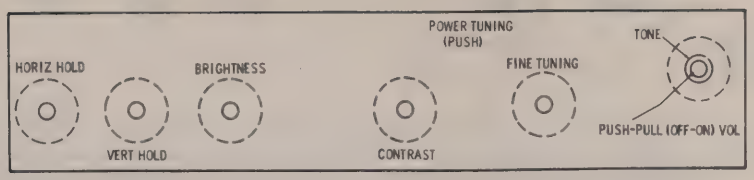
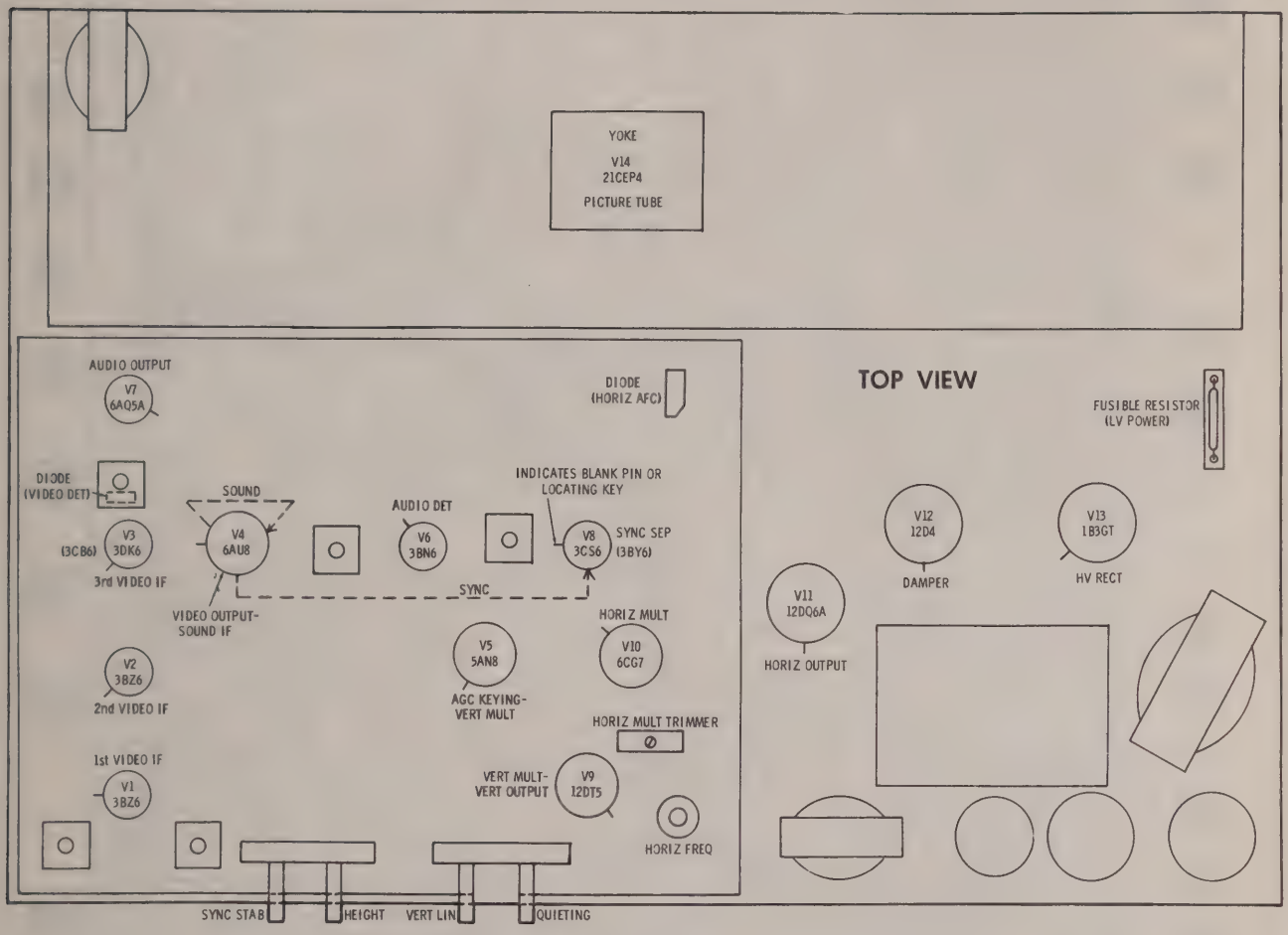
WESTINGHOUSE CHASSIS
V-2376-1, V-2376-2

TUBE PLACEMENT CHART







TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce indicated symptoms. Refer to tube placement chart for location and type of tube.

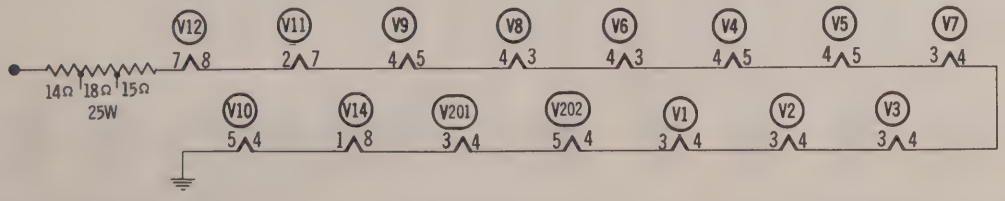
POWER SUPPLY FAILURE
No raster, no sound Fusible Resistor (LV Power), Rect. (B+)

SWEEP FAILURE
No raster, has sound Fuse (Horiz. Swp), V10, V11, V12, V13, V14, Rect. (B+
No vertical deflection V5, V9 Horiz. AFC)
Poor vert. linearity or foldover V5, V9
Poor horiz. linearity or foldover V10, V11, V12
Narrow picture Rect. (B±), V10, V11, V12
Vert. off freq. V5, V9
Horiz. off freq. V10, Rect. (Horiz. AFC)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster V1, V2, V3, Diode (Video Det.), V4
No pic, no sound, has snow V201, V202, V1
No pic, has sound, has raster V4, V14
Has pic, no sound V4, V6, V7
Overloaded picture V5

SYNC FAILURE
No vert. sync V8
No horiz. sync V8, Rect. (Horiz. AFC)
No vert. or horiz. sync V8

This receiver employs tubes used in a series filament network, an open filament in any tube will cause the set to be inoperative. (See circuit below.)



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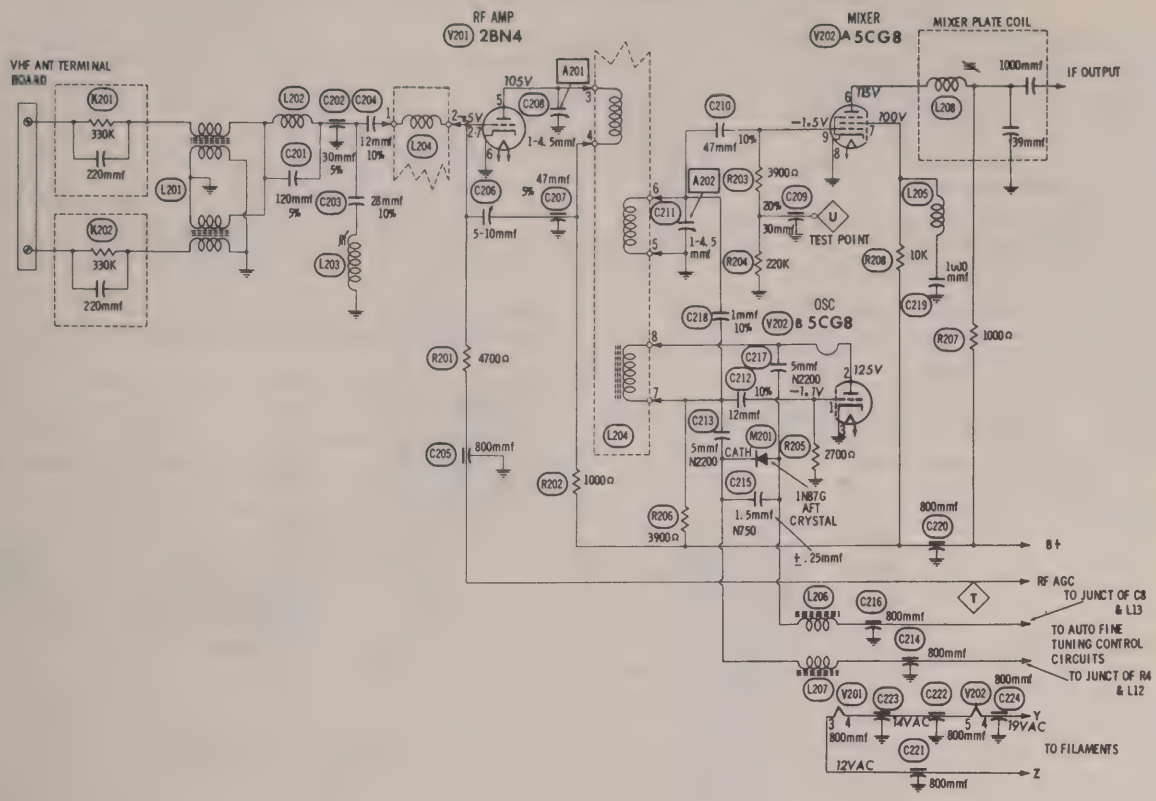
PRINTED BOARD

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



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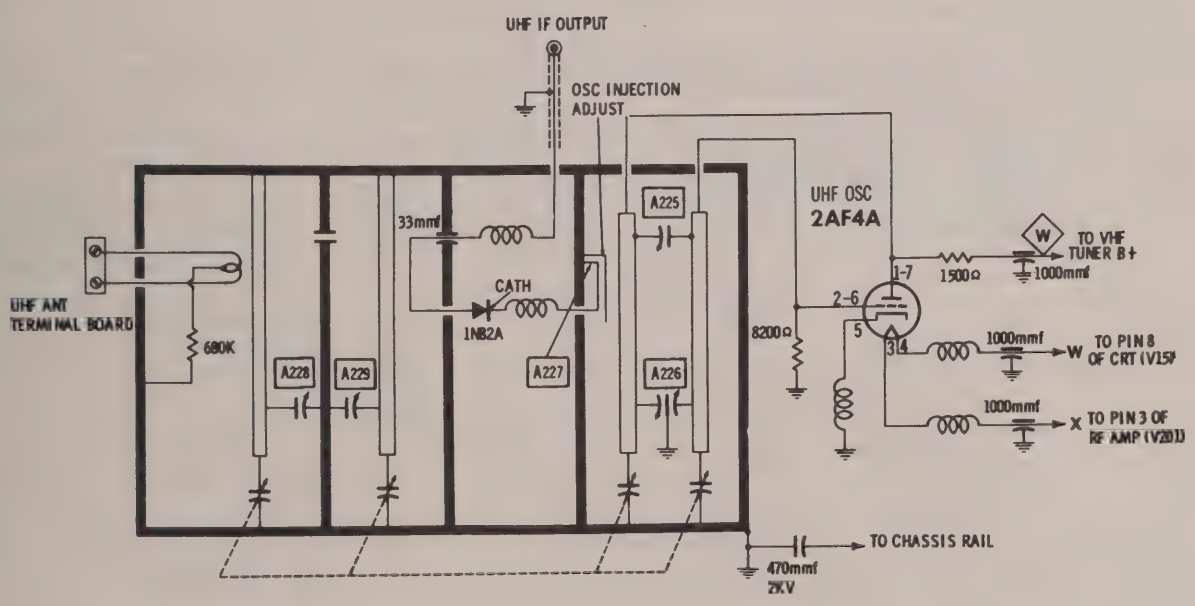
VHF TUNER 470V019H03, 04



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UHF TUNER 472V024H01, 03

TUNER ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS FOR TUNERS 470V019H04, 470V019H05

Use an ISOLATION TRANSFORMER to PROTECT the Test Equipment.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested alignment tools: A201, A202 ..... General Cement #5000, 5003,5014, 5015, 5016, 8276, 8290
Walsco #2512, 2515, 2522, 2523, 2525, 2537

VHF OSCILLATOR ALIGNMENT

The individual channel adjustment screws are accessible one at a time, thru a hole in the front of the tuner, as the Channel Selector is rotated. Set the Fine Tuning to the center of its range and switch to channel to be adjusted and adjust for best picture and sound.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	207MC	205.25MC 209.75MC	12	Vert. Amp. thru 10K to point (U). Low side to chassis.	A201, A202	Adjust for response curve similar to Fig. 202 with markers above 90%.
2.	"	"	213MC	211.25MC 215.75MC	13	"		Check for response similar to Fig. 202. If markers fall below 70% on any channel, make compromise adjustments of A201, and A202 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC	199.25MC 203.75MC	11			
			195MC	193.25MC 197.75MC	10			
			189MC	187.25MC 191.75MC	9			
			183MC	181.25MC 185.75MC	8			
			177MC	175.25MC 179.75MC	7			
			85MC	83.25MC 87.75MC	6			
			79MC	77.25MC 81.75MC	5			
			69MC	67.25MC 71.75MC	4			
			63MC	61.25MC 65.75MC	3			
			57MC	55.25MC 59.75MC	2			

PRE-ALIGNMENT INSTRUCTIONS FOR TUNER 470V021H05

Use an ISOLATION TRANSFORMER to PROTECT the Test Equipment.
The high voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2.5 volt bias supply to point (T). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.
Coils not containing adjustable cores are adjusted by expanding or compressing coil turns.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point (U). Low side to chassis.	A201, A202, A203	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown. Adjust bandwidth by moving lead of Mixer Return Capacitor with respect to RF Plate return strap.
2.	"	"	195MC	193.25MC 197.75MC	10	"	A204, A205	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown.
3.	"	"	177MC	175.25MC 179.75MC	7	"	A206, A207	"
4.	"	"	85MC	83.25MC 87.75MC	6	"	A208, A209, A210	Adjust for maximum gain and symmetry of response similar to Fig. 202 with markers as shown. NOTE: Heat wax to loosen for alignment.
5.	Fig. 203	High side to point (V). Low side to chassis.	44MC	41.25MC 45.75MC	UHF	"	A211, A212	Disconnect coil between UHF jack (point (V)) and chassis. Adjust for response shown in Fig. 204. Replace coil.

TUNER ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

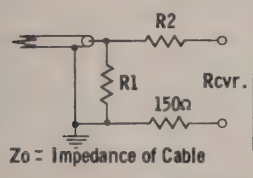
Connect negative lead of a 4.5 volt bias supply to the IF AGC line. Positive to chassis.
Set the Automatic Fine Tuning selector in Manual Fine Tuning position and set Fine Tuning control to the center of its range.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Fig. 201	Across antenna terminals thru matching network (Fig. 201).	213MC	211.25MC 215.75MC	13	Vert. Amp. thru 47K across Video Det. load.	A213	Adjust to place sound marker in trap notch as in Fig. 205. Video marker should fall at 50%.
			207MC	205.25MC 209.75MC	12		A214	
			201MC	199.25MC 203.75MC	11		A215	
			195MC	193.25MC 197.75MC	10		A216	
			189MC	187.25MC 191.75MC	9		A217	
			183MC	181.25MC 185.75MC	8		A218	
			177MC	175.25MC 179.75MC	7		A219	
			85MC	83.25MC 87.75MC	6		A220	
			79MC	77.25MC 81.75MC	5		A221	
			69MC	67.25MC 71.75MC	4		A222	
			63MC	61.25MC 65.75MC	3		A223	
			57MC	55.25MC 59.75MC	2		A224	

UHF TUNER ALIGNMENT

Remove the front cover and make sure that inner cover is on tight.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Use only enough sweep generator output to provide a usable pattern on scope.
Use 10MC sweep unless otherwise noted.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Fig. 201	Across UHF antenna terminals thru matching network (Fig. 201). Loosely couple VHF marker generator to UHF tuner output cable. Loosely couple UHF marker generator to sweep generator cable.	464MC	44MC & 464MC	Tuning gang fully closed	Vert. Amp. thru network in Fig. 206 to point Ⓦ. Low side to chassis.	A225	Adjust for zero beat.
8.	"	"	897MC	44MC 897MC	Tuning gang fully open	"	A226	"
9.	Disconnect sweep and marker generators. Slowly rotate UHF tuning shaft while observing meter readings. Adjust injection shield (A227) so that meter reads between .5 and 5 ma in all positions of rotor shaft. Replace front cover.							
10.	Fig. 201	Across UHF antenna terminals thru matching network (Fig. 201). Loosely couple marker generator to sweep cable.	467MC	465.25MC 469.75MC	Back rotor shaft off from high freq. end approx. 3°	Vert. Amp. thru network in Fig. 206 to point Ⓦ. Low side to chassis.	A228, A229	Adjust for maximum gain and symmetry of response similar to Fig. 201 with markers as shown. Check tracking throughout UHF band and make compromise adjustments where necessary.



Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 201

FIG. 202

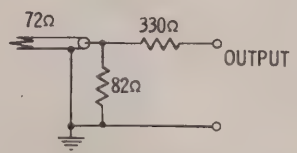


FIG. 203

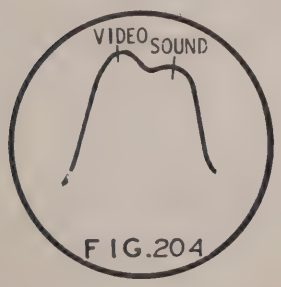


FIG. 204

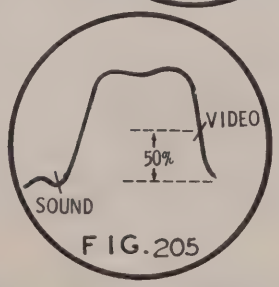


FIG. 205

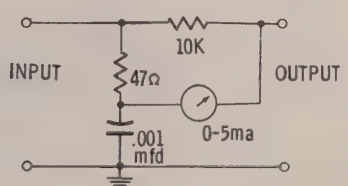
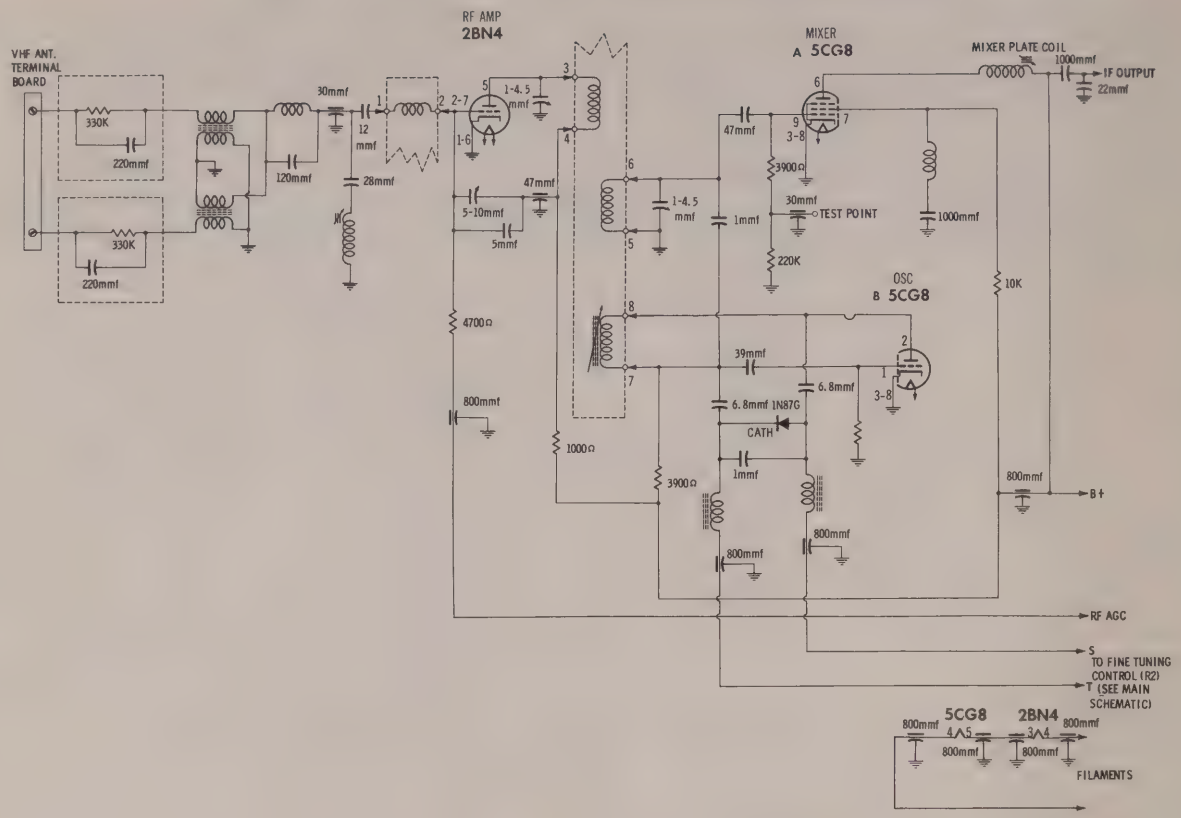


FIG. 206



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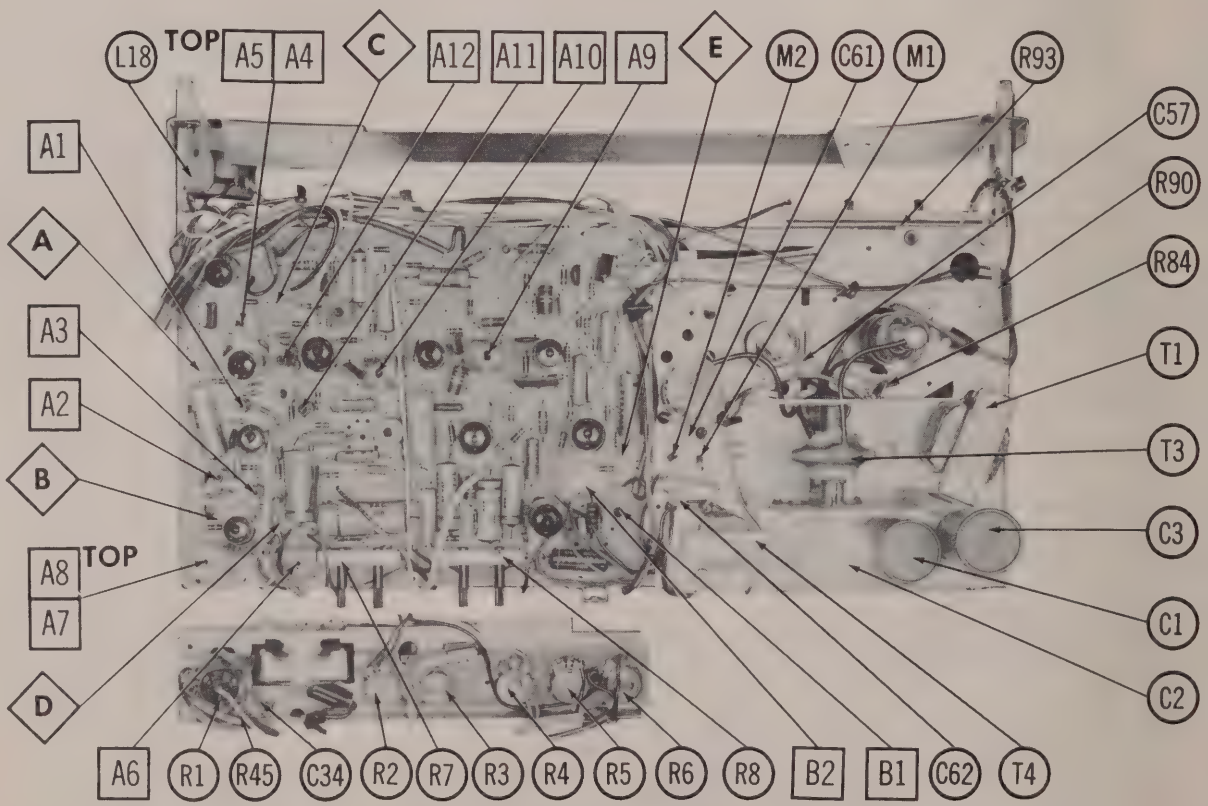
VHF TUNER 470V019H05



CHASSIS - TOP VIEW

ALIGNMENT INSTRUCTIONS

PRE-ALIGNMENT INSTRUCTIONS

Use an isolation transformer TO PROTECT the Test Equipment.
The High Voltage lead should be securely taped and kept away from the chassis.
Allow a 20 minute warm-up period for the receiver and test equipment.
Suggested Alignment Tools: GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

VIDEO IF ALIGNMENT

Connect the negative lead of a 4 volt bias supply to point Ⓐ. Positive to chassis.
Connect the negative lead of a 2.5 volt bias supply to point Ⓑ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to to the horizontal input of the oscilloscope for horizontal deflection.
The generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough generator output to provide a usable indication on VTVM.
Use only enough sweep generator output to provide a usable pattern on scope.
Detune A5, A7 and A8.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001mfd	High side to pin 1 (grid) of 1st Video IF. Low side to chassis.	Not used	45.25MC (Unmod)	Any non-interfering channel	USE VTVM DC probe thru 47K to point Ⓒ. Common to chassis. (Across Video Det. load)	A1	Adjust for maximum negative voltage.
2.	"	"	"	39.75MC	"	"	A2	Adjust for MINIMUM deflection.
3.	"	"	"	41.8MC	"	"	A3	Adjust for maximum deflection.
4.	"	"	44.0MC (10MC Swp)	44.0MC	"	USE SCOPE Vert. Amp. thru 47K to point Ⓒ. Low side to chassis.	A4	Adjust to peak at 44.0MC.
5.	"	"	"	45.75MC 44.75MC 42.25MC 41.25MC 39.75MC	"	"	A5	Adjust until high frequency peak falls at 44.75MC. Retouch A4 to obtain a symmetrical double peak response similar to Fig. 1.
6.	Direct	Place a thin insulated metal strip between the Mixer-Osc. tube (V202), and tube shield. Connect the high side of sweep generator to the metal strip. Low side to chassis.	"	41.25MC	"	"	A6	Detune by turning several turns clockwise. Then adjust to place marker in trap notch as in Fig. 2.
7.	"	"	"	44.0MC 45.75MC	"	"	Mixer Plate Coil & A7	Adjust Mixer Plate Coil for maximum amplitude at 44.0MC. Adjust A7 to obtain a symmetrical response which rocks about 44.0MC. The 45.75MC marker should fall at about 50% on curve as in Fig. 2.
8.	"	"	"	47.25MC	"	"	A8	Adjust to place marker in 47.25MC trap notch as in Fig. 2.

SOUND IF ALIGNMENT

Connect an AC VTVM or scope across the Volume control. Set the Quieting control to the center of its range.
Inject a strong 4.5MC FM signal at point Ⓒ (across Video Det. load) thru a .001mfd capacitor. Adjust A9 for maximum output.
Reduce the signal strength to the lowest level that will produce an indication and adjust A10 and A11 for maximum output.
Retouch A9, A10, A11. Using a strong 4.5MC AM signal, adjust the Quieting control for MINIMUM AM output.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001mfd	High side to point Ⓒ. Low side to chassis. (Across Video Det. load)	4.5MC (Unmod)	Any non-interfering channel	AC probe to point Ⓓ. Common to chassis.	A12	Adjust for MINIMUM AC voltage.

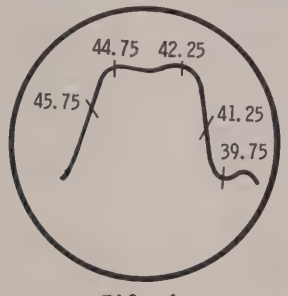


FIG. 1

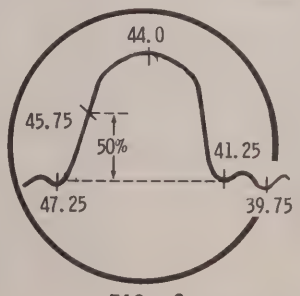


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	CBS	GENERAL ELECTRIC	ITEM No.	RAYTHEON	SYLVANIA
	USE	TYPE		USE	TYPE
V1	1st Video IF Amp.	3BZ6	V8	Sync Sep.	3C9S (5BY6)*
V2	2nd Video IF Amp.	3BZ6	V9	Vert Mult. - Vert. Output	12DT8
V3	3rd Video IF Amp.	3DK6 (3CB6) *	V10	Horiz. Mult.	6CG7
V4	Video Output-Sound IF Amp	6AU8	V11	Horiz. Output	12DQ6A
V5	AGC Keying-Vert Mult	6AN8	V12	Damper	1B3G
V6	Audio Det	3BN6	V13	HV Rect.	1B3GT
V7	Audio Output	6AQ5A			

* Alternate.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA					NOTES
	Westinghouse PART No.	GENERAL ELECTRIC PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
V14	21CEP4	21CEP4 ①	21CEP4 ①	21CEP4	21CEP4, 21CEP4A ③	① Aluminized ② "Silver Screen 85"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	160	200	218V021H01	AFHH-37-35	XA2S56	FP131	TM6-34	TVL-1473	
C2A	±160	350	218V030H01	AFH4-56-95	XD0695	FP419.85		TVL-4905.5	
B	±60	300							
C	±10	300							
D	4	300							
C3A	±150	300	218V035H30	AFH4-62-80				TVL3-4589*	
B	±50	300							
C	±30	300							
D	30	300							
C4	100	25	218V035H04	PRH270	BBR100-25	TC2S01	TD-100-25	TVA-1307	①

① Some versions may use 20mfd @ 25V (Part #218V025H10).
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA						
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.	
C5	680 2000V		HVD-30-680	DD30-68	HVB20T68	VCM-35-681M	2HV-368	30GA-T68	
C6	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47	
C7	.022 200V		P288N-022		CUB4S22	4DP-2-223	GEM-4122	2TM-S22	
C8	4700		BPD-0047	DD-472	BYA10D47M	CCD-473	B-347	5HK-D47	
C9	800		BPD-0008	DD-801	LU7T8	CCD-S81	B-381	5GA-T80	
C10	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C11	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C12	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C13	22 200V		P288N-22		CUB2P23	2DP-4-224	GEM-2032	2TM-P22	
C14	680 2000V		HVD-30-680	DD30-68	HVB20T68	VCM-35-681M	2HV-368	30GA-T68	
C15	2.2 10%		NPO-BT 2.2		CCTO-2R2	CCTO-2R2	CNC-522	10TCC-V22	
C16	68 NPO 10%		NPO-DI 68	DTZ-68	C10Q68C	CCTO-680	CNC-468	10TCC-Q68	
C17	1000		BPD-001	DD-102	BYA10D1	CCD-102	B-310	5HK-D10	
C18	800		BPD-0008	DD-801	LU7T8	CCD-S81	B-381	5GA-T80	
C19	1500		BPD-0015	DD-152	BYA10D15	CCD-153	B-315	5HK-D15	
C20	56			DD-560	L10Q56	CCD-560	GP456	5GA-Q56	
C21	32 400V		P488N-32		CUB4P32	4DP-5-324	GEM-4032	4TM-P32	
C22	.01 600V		P488N-01	D6-103	CUB4S	4DP-1-103	GEM-411	4TM-S1	
C23	33 200V		P288N-33		CUB2P33	2DP-5-334	GEM-2033	2TM-P33	
C24	4700 1400V		HVD-15-4700	DD30-472	HVC20D47	16DP-2-472	2HV-247	30GA-D47	
C25	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1	
C26	6.7		NPO-BI 6.7	TCZ-6R7	C10Y67C	CCTO-6R4	CNO-567	10TCC-Y67	
C27	15 N220 10%	#215V01LA50						10TCR-Q15	
C28	2.7 NPO ±.25mmf	#215V122A79						10TCC-V27	
C29	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10	
C30	022 600V		P668N-022		CUB6S22	6DP-2-223	GEM-6122	6TM-S22	
C31	220 10%		DI-220	DD-221	L10T22	CCD-221	GP322	10T8-T22	
C32	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47	
C33	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47	
C34	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47	
C35	.0047 600V		P668N-0047	D6-472	CUB6D47	6DP-1-472	GEM-6247	6TM-D47	
C36	047 600V		P668N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47	
C37	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10	
C38	4700		BPD-0047	DD-472	BYA10D47M	CCD-472	B-347	5HK-D47	
C39	.0027 600V		P668N-003	D6-272	CUB6D3	6DP-1-302	GEM-623	6TM-D3	
C40	.047 600V 10%		V66C6847-10%	DD-503	P668N47	6DP-3-473		6TM-S47	
C41	.15 200V		P288N-15		CUB2P15	2DP-3-154	GEM-3015	2TM-P15	
C42	047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47	
C43	047 600V		P668N-047	DD-503	CUB6S47	6DP-3-473	GEM-6147	6TM-S47	
C44	.22 600V		P668N-22		CUB6P1	6DP-5-224	GEM-6032	6TM-P22	
C45	47 NPO 10%		NPO-DI 47	DTZ-47	C10Q47C	CCTO-470	CNO-447	10TCC-Q47	
C46	39		DI-39	DD-390	L10Q39	CCD-390	GP439	10TCC-Q39	
C47	220 10%		DI-220	DD-221	L10T22	CCD-221	GP322	10T8-T22	
C48	680 10%		DI-680	DD-681	LR5T68	CCD-681	GP368	10T8-T68	
C49	3300 10%		1469-00039		9S3T39	CM-30D-332K	MC3S33	5S-339	
C50	.01 400V		P488N-01	D6-103	CUB4S	4DP-1-103	GEM-411	4TM-S1	
C51	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-301	2TM-P1	
C52	1000 10%		1469-001	DD-102	1R5D1	CM-20D-102K	MC2S10	M2-D1	
C53	68 NPO 10%		NPO-DI 68	DTZ-68	C10Q68C	CCTO-680	CNO-468	10TCC-Q68	
C54	19-150	#217V50LH01							
C55	.01 400V		P488N-01	D6-103	CUB4S	4DP-1-103	GEM-411	4TM-S1	
C56	.047 400V		P488N-047	DD-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47	
C57	180 5000V 5%	#215V300H37				4VDM-42-181J			
C58	.47 200V		P288N-47		CUB2P47	2DP-5-474	GEM-3047	2TM-P47	
C59	.01 400V		P488N-01	D6-103	CUB4S47	4DP-1-103	GEM-411	4TM-S1	
C60	.033 600V		P668N-033		CUB6D3	6DP-3-333	GEM-6133	6TM-D33	
C61	1500 1400V		HVD-15-1500	DD30-152	HVC15D15	16DP-1-152	2HV-215	30GA-D15	
C62	1500 1400V		HVD-15-1500	DD30-152	HVC15D15	16DP-1-152	2HV-215	30GA-D15	
C63	.033 600V		P668N-033		CUB6S3	6DP-3-333	GEM-6133	6TM-S33	
C64	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C65	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C66	680		BPD-00068	DD-681	BYA10T68	CCD-681	B-368	5GA-T68	
C67	.15 600V		P668N-15		CUB6P15	6DP-5-154	GEM-6015	6TM-P15	

Westinghouse Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA				INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	50K	½	270V029H04					Tone
B	500K	½						Volume
	150K tap							
C	Switch							Push-Push Off-On
R2A	10K	½	270V034H04	AB-17	A47-10K-V	Q17-116	U19	Fine Tuning
B	Shaft			AK-9	RS-2	Not Req	Not Req	
R3A	15K	½	270V032H04	B-20	A47-15K-S	BU-L8	TA15L	Contrast
B	Shaft			Not Req.	KS5-3	SK-1	Not Req.	
R4A	100K	½	[illegible]	B-40	A47-100K-S	QU-128	TA15L	Brightness
B	Shaft			Not Req.	KS6-3	Not Req.	Not Req.	
R5A	2meg	½	270V060H01	B-75	A47-2meg-S	QU-139	TA26L	Vert. Hold
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R6A	60K	½	270V032H01	B-35	A47-75K-S	QU-125	TA15L	Horiz. Hold
B	Shaft			Not Req.	[illegible]	Not Req.	Not Req.	
R7A	5meg	½	270V035H02					Sync
B	5meg	½						Height
R8A	500K	½	270V035H03					Vert. Lin.
B	600Ω	½						Quieting

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R9	15meg 5%	
R10	1.5meg	Note 1
R11	680Ω	
R12	8200Ω	
R13	560K	
R14	33K	
R15	470Ω	
R16	47Ω	
R17	8200Ω	
R18	100K 5%	
R19	47K	
R20	470Ω	
R21	27Ω	
R22	470Ω	
R23	150Ω	
R24	220Ω	
R25	10K	
R26	3900Ω 5%	
R27	8200Ω	
R28	470Ω	
R29	10Ω	
R30	2700Ω 3W	
R31	2700Ω 3W	
R32	22K 1W	
R33	56K 1W	
R34	150K	
R35	150K	
R36	18K	
R37	12K 5%	

ITEM No.	RATING	REMARKS
R38	68K 5% 1W	
R39	100K	
R40	470Ω	(47Ω) *
R41	470Ω	
R42	1meg 1W	
R43	12K	
R44	22K 2W	
R45	22K	
R46	330Ω 1W	
R47	270K	
R48	47K	
R49	6800Ω	
R50	2.2meg	
R51	470K	
R52	10K 2W	
R53	82K	
R54	100K	
R55	100K	
R56	1meg	
R57	82K	
R58	1.5meg	
R59	2.2meg 1W	
R60	180K	
R61	22K 1W	
R62	150Ω	
R63	27K 2W	
R64	47Ω	
R65	560Ω	
R66	560Ω	

ITEM No.	RATING	REMARKS
R67	270Ω 2W	
R68	8200 7W	#251V020H51
R69	680K	
R70	1meg	
R71	680K	
R72	47K	
R73	4700Ω	
R74	10K	
R75	47K 1W	
R76	82K	
R77	56K	
R78	180K 5%	
R79	1000Ω	
R80	470K	
R81	150Ω	
R82	12K 7W	#217V50H15
R83	1000Ω 1W	
R84	4700Ω 1W	
R85	680K	
R86	10meg 1W	
R87	2.2meg	
R88	100K 1W	
R89	4.7Ω 1W	
R90	7.5Ω	#259V007H01
R91	15500 20W	#251V017H11
R92	1000Ω	
R93A	14Ω	#217V50LH10
B	18Ω)25W	
C	15Ω	

* Alternate value. # Westinghouse Part Number.
Note 1. Used with tuners 470V021H03, 05, 470V043H03.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	Westinghouse PART No.	REPLACEMENT DATA
K1	Sync Coupling	330mmf, 220K	219V004H02	Centralab RC-431 Sprague PRC-2
K2	Vert. Integrator	2000mmf, 5000mmf, 3000mmf, 22K, 6200Ω, 8200Ω	219V003H01	Aerovox PA-110 Centralab PC-104 Cornell-Dubilier 115TM1 Sprague V1/V3
K3	Chassis Isolation	1500mmf @ 1400VAC, 330K	219V004H03	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Westinghouse PART No.	Gromer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	41.25MC Trap	230V068H01						①
L2A	1st Video IF	235V021H02						
B	47.25MC Trap							
L3	2nd Video IF	235V020H01						
L4	39.75MC Trap	230V030H01						
L5	3rd Video IF	235V020H01						
L6A	4th Video IF	235V005H03						Includes M5
B	RF Choke							4.7uh
C	RF Choke		19-1006	19-1006		4624		14uh
L7	RF Choke	230V019H10	19-1006	19-1006		4624		14uh
L8	Shunt Peaking Coil	230V034H04	19-3500	19-3500	TV-168	6174	VP-8	800uh
L9	4.5MC Trap	230V030H02						
L10	Series Peaking Coil	230V034H03	19-3125	19-3125	TV-196	6130		140uh
L11	Shunt Peaking Coil	230V034H07	19-4950	19-4950	TV-206	6157		980uh
L12	1st Sound IF	230V030H06						
L13	2nd Sound IF	235V020H02						
L14	Quadrature Coil	230V031H01						
L15	RF Choke	230V019H10	19-1006	19-1006		4624		14uh
L16	RF Choke	230V019H10	19-1006	19-1006		4624		14uh

① Early production versions use Part #230V058H01 in this application.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA					NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Miller PART No.	Ram PART No.	Thordarson PART No.	
L17	100Ω		230V032H01						Horiz. Osc.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	CURRENT (Measured)	DC RES	INDUCTANCE 10 CURRENT 1000 ~/.1	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L18	200A	20Ω	.5 hy	430V064H01	26C41	C-3994	F-804	C-2327	26C41	C-27X

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA							
		Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Rogers PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Vert. Output	430V039H01	26S73	A-3823	V307	VO33	A-8144	26S72	A-108X
T2	Yoke-Horiz. (19.6MH) (1100)-Vert. (23MH)	490V006H02	Y-53 ①					Y-53 ①	Y-62 & NW-1
	Rear Cover & Centering Device	781V010H01							YC-110
	Yoke Clamp	756V014H03							
T3	Horiz. Output	493V003H05	FLY-96*					FLY-96*	D-508

① Use original rear cover and centering device.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	Ram Replacement Connections	Rogers Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	6					6	
5	4					4	
4	4					4	
T	T					T	
3	3					3	
1	1					1	
2	2					2	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T4	7500Ω	3-4Ω	430V045H01	26S48	A-3020	AU-804	A-3823	26S48	S-8Z	

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	2" x 10"	PM	3-4Ω	570V038H01 ①		① Models H-21T300, 301, 302, 303, 304, H-21TU303
	2" x 10"	PM	3-4Ω	570V023H01 ②		② Alternate Part Number.
	5"	PM		570V010H02 ③		③ Models H-21K311, 312, 315
	5"	PM		570V010H01 ④		④ Models H-21K/KU306, 309, 310
	8"	PM		570V008H02 ⑤		⑤ Models H-21K/KU308, 309, 310, 311, 312, 313
	8"	PM		570V037H01 ⑥		⑥ Models H-21K/KU305, 306

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	Westinghouse PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.310A	295V006H03 ①	HA504 ①	SD500 ①	40K ①	SR500 ①	① Silicon Type
M2	.310A	295V006H03 ①	HA504 ①	SD500 ①	40K ①	SR500 ①	② Selenium Type
M3		296V004H01 ②	K1615 ②	1T1 ② ③			③ Two Required

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Westinghouse PART No.	LITTELFUSE PART No.		BUSS PART No.		
			FUSE	FUSE	HOLDER	FUSE	HOLDER	
M4	3AG	1/2A 250V P/T	758V003H04	318.500 (3AG-1/2A-250V-P/T)		GJV 1/2		

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		Westinghouse PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M5	1N64 (1N295)*	V-10916-3	1N60	1N295	1N295	Video Detector (Pigtail) * Alternate

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M6	Tuner	470V019H03	VHF Ch. Y-2376-1
	Tuner	470V019H04	VHF Ch. Y-2376-1
	Tuner	470V019H05	VHF Ch. Y-2376-1
	Tuner	470V043H03	VHF Ch. Y-2376-1
	Tuner	470V021H03	VHF with UHF provisions, Ch. Y-2376-2
	Tuner	470V021H06	VHF with UHF provisions, Ch. Y-2376-2
	Tuner	472V024H01	UHF Ch. Y-2376-2
	Tuner	472V024H03	UHF Ch. Y-2376-2
M7	Switch	756V012H01	Channel Selector
M8	Motor	787V052H01	Drive Assembly Complete (Includes Motor Run Switch & Blanking Switch)

WESTINGHOUSE CHASSIS V-2376-1, V-2376-2

FOLDER 2

PARTS LIST AND DESCRIPTIONS (Continued)

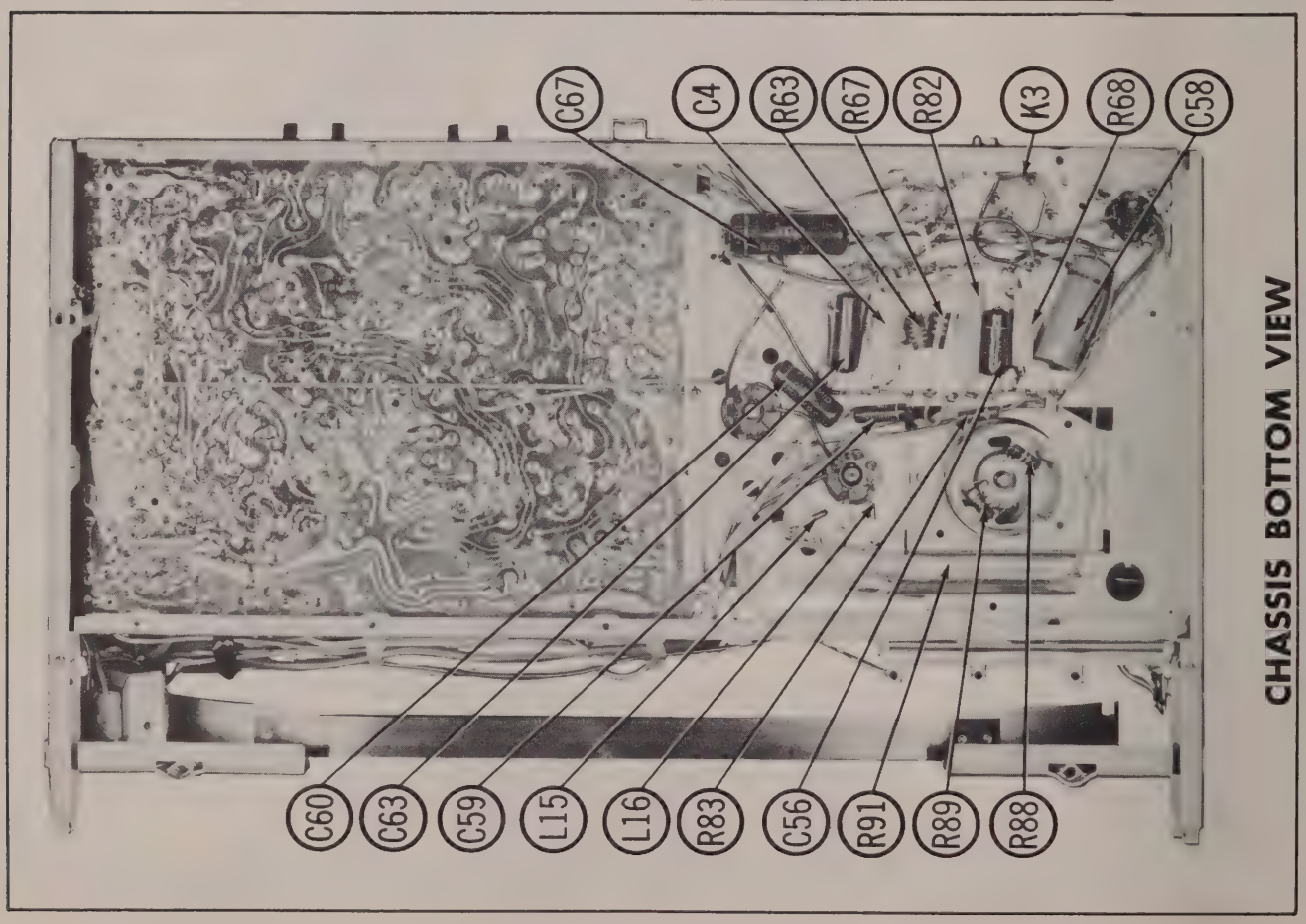
CABINETS & CABINET PARTS

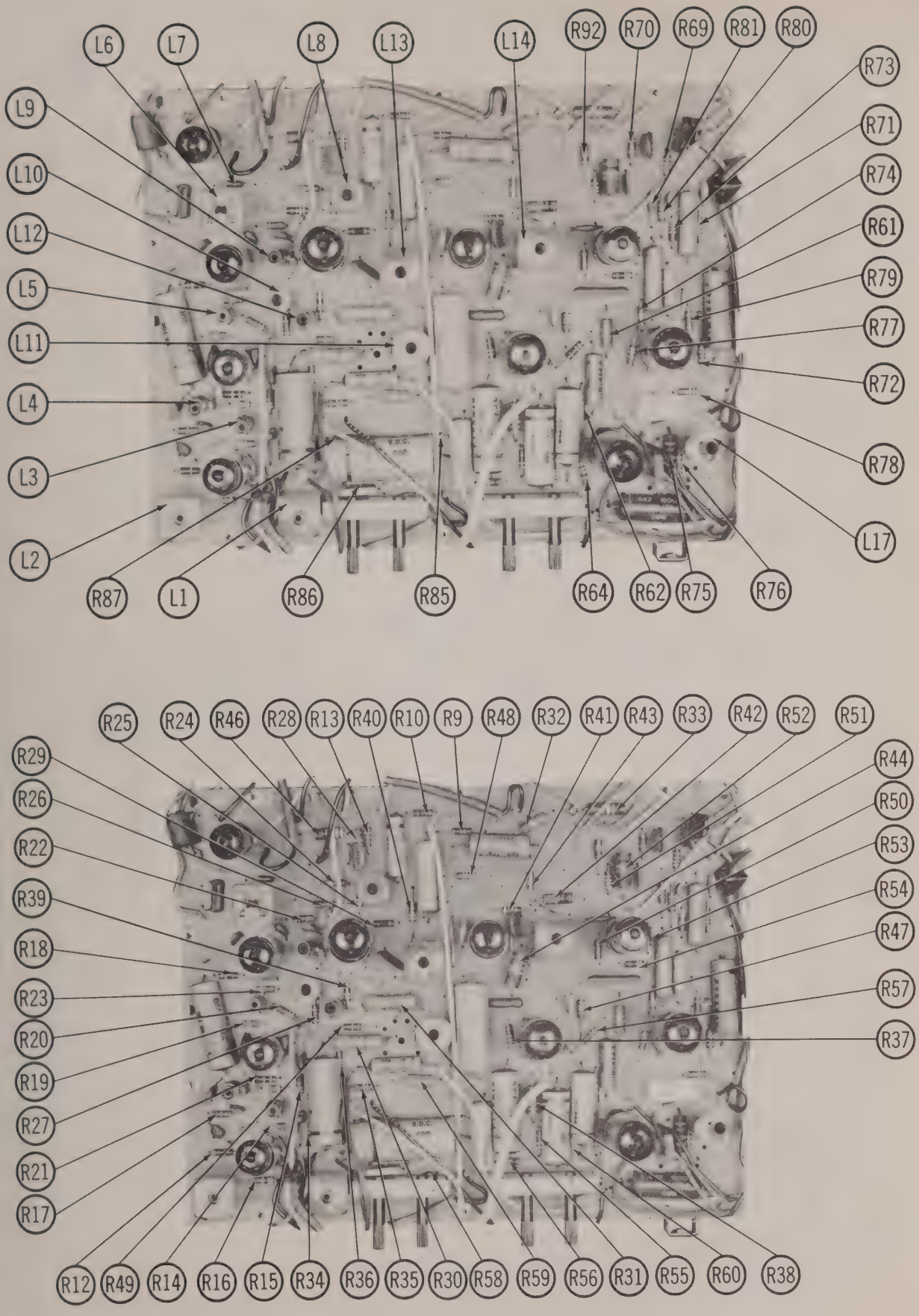
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	630V008H01	
Mask	610V007H04	
Bar	558V070H01	Automatic Channel Selector
Knob	550V050H01	UHF Channel Selector
Knob	550V044H01	Fine Tuning, Brightness, Vertical Hold, Horizontal Hold, Contrast
Knob	550V029H04	UHF Dial
Knob	550V045H01	Off-On, Volume
Knob	550V047H01	Tone
Cabinet	510V011H13	Model H-21T300
Cabinet	510V011H15	Model H-21T301
Cabinet	516V037H01	Model H-21T302
Cabinet	516V037H03	Model H-21TU302
Cabinet	516V037H02	Model H-21T303
Cabinet	516V037H04	Model H-21TU303
Cabinet	516V037H05	Model H-21T304
Cabinet	516V037H06	Model H-21TU304
Cabinet	516V039H01	Model H-21K305
Cabinet	516V039H03	Model H-21KU305
Cabinet	516V039H02	Model H-21K306
Cabinet	516V039H04	Model H-21KU306
Cabinet	516V040H01	Model H-21K308
Cabinet	516V040H03	Model H-21KU308
Cabinet	516V041H02	Model H-21K309
Cabinet	516V041H04	Model H-21KU309
Cabinet	516V041H05	Model H-21K310
Cabinet	516V041H06	Model H-21KU310
Cabinet	516V042H01	Model H-21K311
Cabinet	516V042H02	Model H-21K312
Cabinet	516V043H03	Model H-21K313
Cabinet Base	690V012H09	Includes Legs, Model H-21K309
Cabinet Base	690V012H10	Includes Legs, Model H-21K310
Leg	518V001H01	Model H-21K305
Leg	518V001H02	Model H-21K306

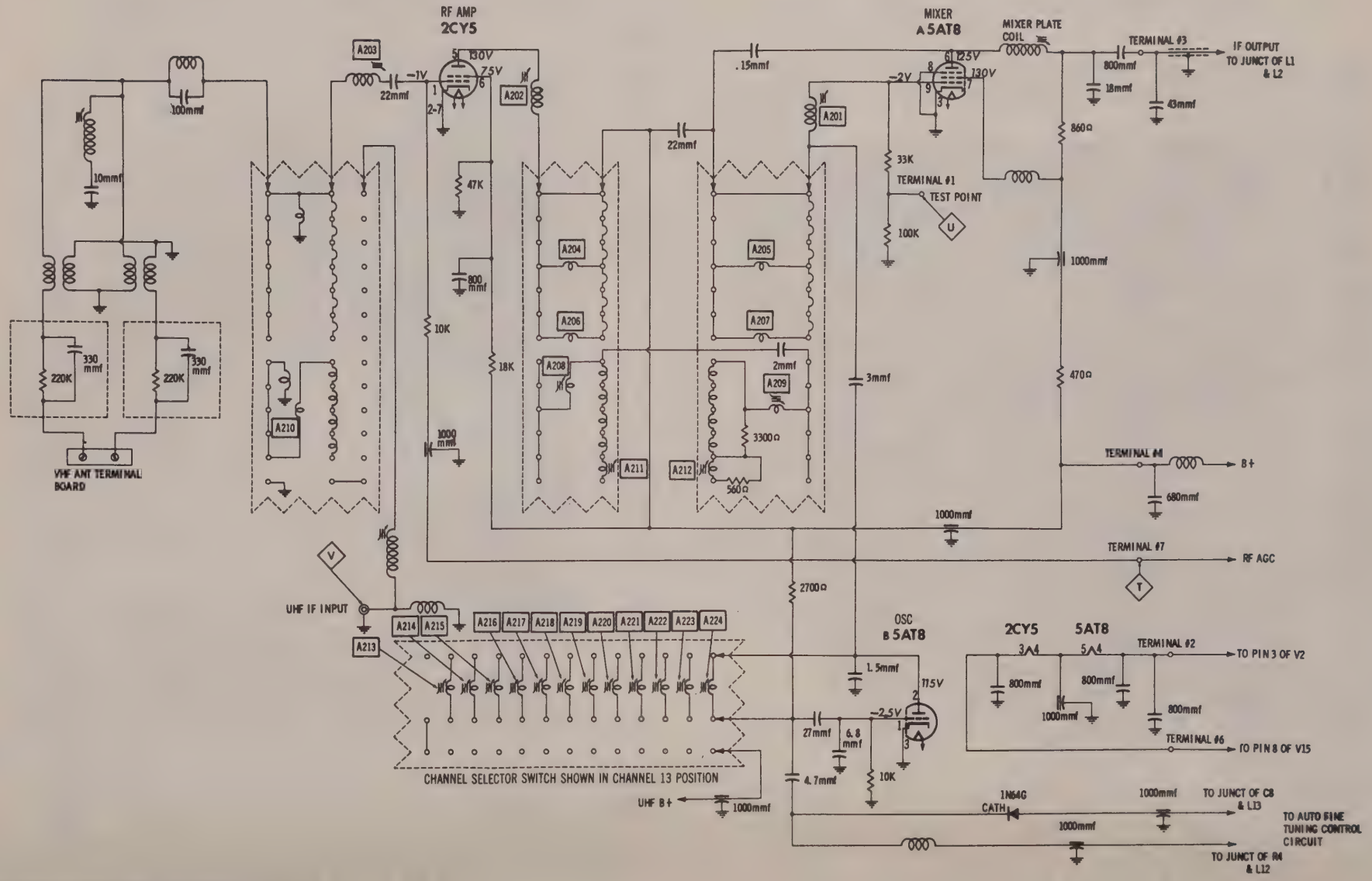
WIRING DATA

High Voltage Lead	Use BELDEN No. 8869
Shielded Hook-up Wire	Use BELDEN No. 8885 (Single Conductor) 8738 (Two Conductor)
General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type)	Use BELDEN No. 8874
300Ω Tuner Input Lead	Use BELDEN No. 8225
300Ω Antenna Lead-in	Use BELDEN No. 8230 or 8275
Antenna Rotor Cable	Use BELDEN No. 8464 (Flat) or 8484 (Round) - 4 Conductor 8485 (Round) - 5 Conductor 8488 (Round) - 8 Conductor





PRINTED BOARD - RESISTOR & INDUCTOR IDENTIFICATION



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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VHF TUNER WITH UHF PROVISIONS 470V021H03, 05, 470V043H03

TUNER PARTS LIST AND DESCRIPTIONS

470V019H04

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V201	RF Amp.	2BN4	

ITEM No.	USE	TYPE	NOTES
V202	Mixer-Osc.	5CG8	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	Westinghouse PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C201	120				DTZ-120		CNO-312	10TS-T12	5%
C202	30		690V004H18						5%
C203	28		690V004H20						10%
C204	12		690V004H19						10%
C205	800			EF-001	MFT-1000			503C-D1	
C206	5-10		690V004H22		829-10		ST-553-Z		
C207	47		690V004H25						5%
C208	1-4.5		690V004H24		829-6		CT-551		
C209	30		690V004H18						
C210	47		690V004H26						10%
C211	1-4.5		690V004H24		829-6		CT-551		
C212	12		690V004H28						
C213	5		690V004H21						N2200
C214	800			EF-001	MFT-1000			503C-D1	
C215	1.5		V-8749						N750 ±.25mmf
C216	800			EF-001	MFT-1000			503C-D1	
C217	5		690V004H21						N2200
C218	1		217V001A09	NPO-SI 1	TCZ-1				10%
C219	1000			BPD-001	DD-102	BYA6D1	B-210	5HK-D1	
C220	800			EF-001	MFT-1000			503C-D1	
C221	800			EF-001	MFT-1000			503C-D1	
C222	800			EF-001	MFT-1000			503C-D1	
C223	800			EF-001	MFT-1000			503C-D1	
C224	800			EF-001	MFT-1000			503C-D1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		Westinghouse PART No.	NOTES
	OHMS	WATT		
R201	4700Ω			
R202	1000Ω			
R203	3900Ω			
R204	220K			

ITEM No.	RATING		Westinghouse PART No.	NOTES
	OHMS	WATT		
R205	2700Ω			
R206	3900Ω			
R207	1000Ω			
R208	10K			

COILS (RF-IF)

ITEM No.	USE	Westinghouse PART No.	NOTES
L201	Ant. Trans.	690V004H02	
L202	Ant. Coil	690V004H03	
L203	IF Trap Coil	690V004H04	
L204A	Ant., RF, Mixer Grid & Osc. Coils	690V005H02	Channel 2
B	"	690V005H03	Channel 3
C	"	690V005H04	Channel 4
D	"	690V005H05	Channel 5
E	"	690V005H06	Channel 6
F	"	690V005H07	Channel 7
G	"	690V005H08	Channel 8

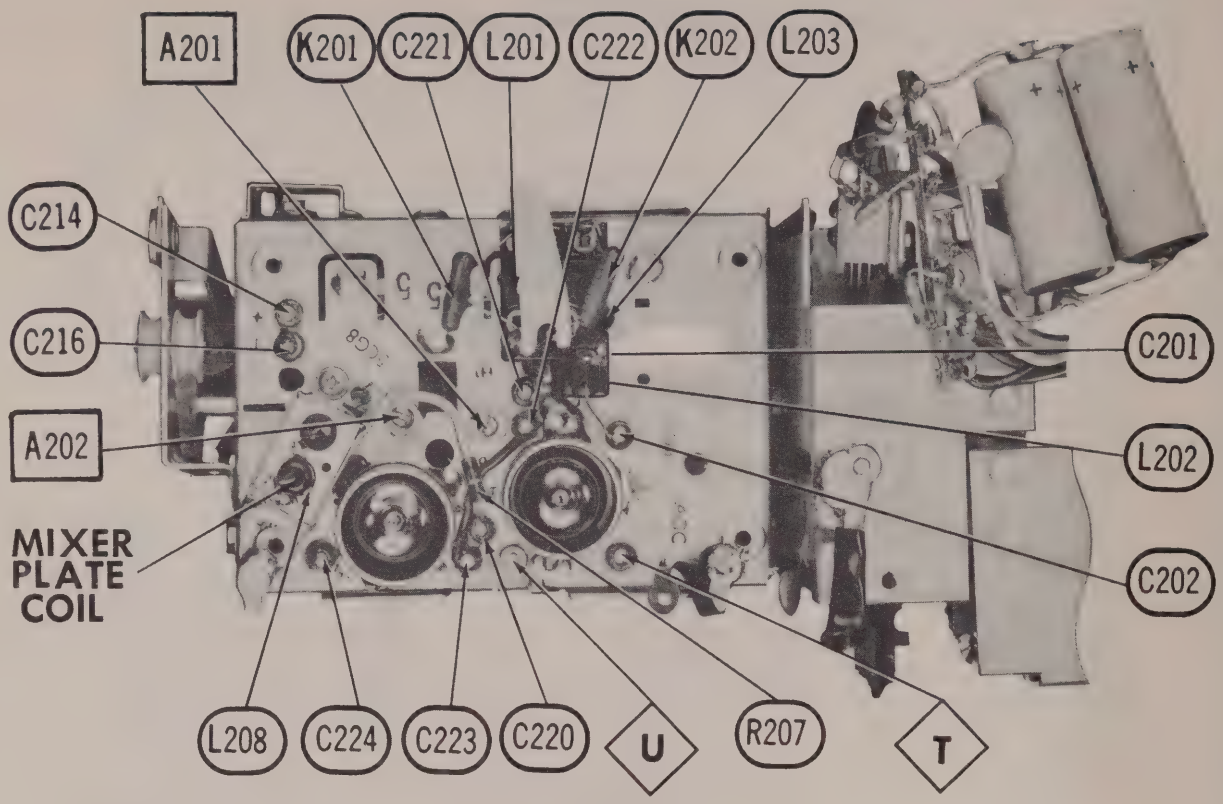
ITEM No.	USE	Westinghouse PART No.	NOTES
L204H	Ant., RF, Mixer Grid & Osc. Coils	690V005H09	Channel 9
I	"	690V005H10	Channel 10
J	"	690V005H11	Channel 11
K	"	690V005H12	Channel 12
L	"	690V005H13	Channel 13
L205	RF Choke	690V004H32	
L206	RF Choke	690V004H33	
L207	RF Choke	690V004H33	
L208	Mixer Plate Coil	690V004H05	

COMPONENT COMBINATIONS

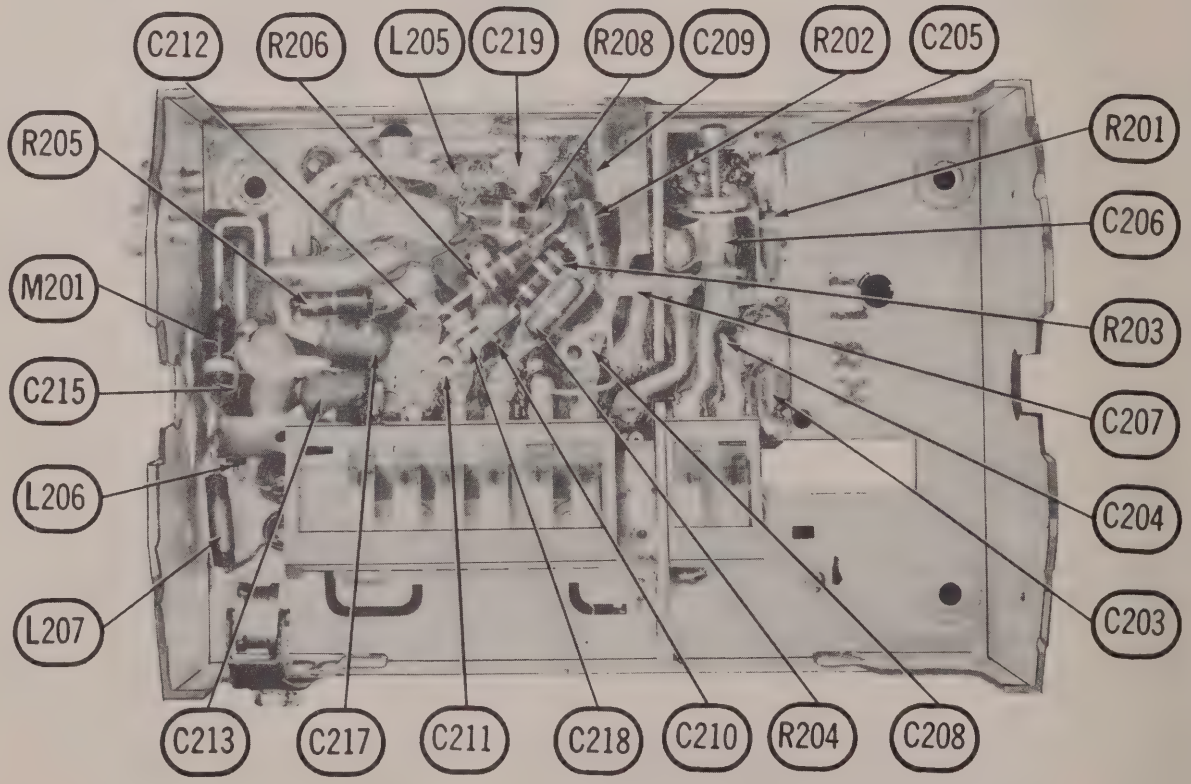
ITEM No.	USE	DESCRIPTION	Westinghouse PART No.	REPLACEMENT DATA
K201	Antenna Isolation	330K, 220mmf	219V004H02	
K202	Antenna Isolation	330K, 220mmf	219V004H02	

CRYSTAL DIODES

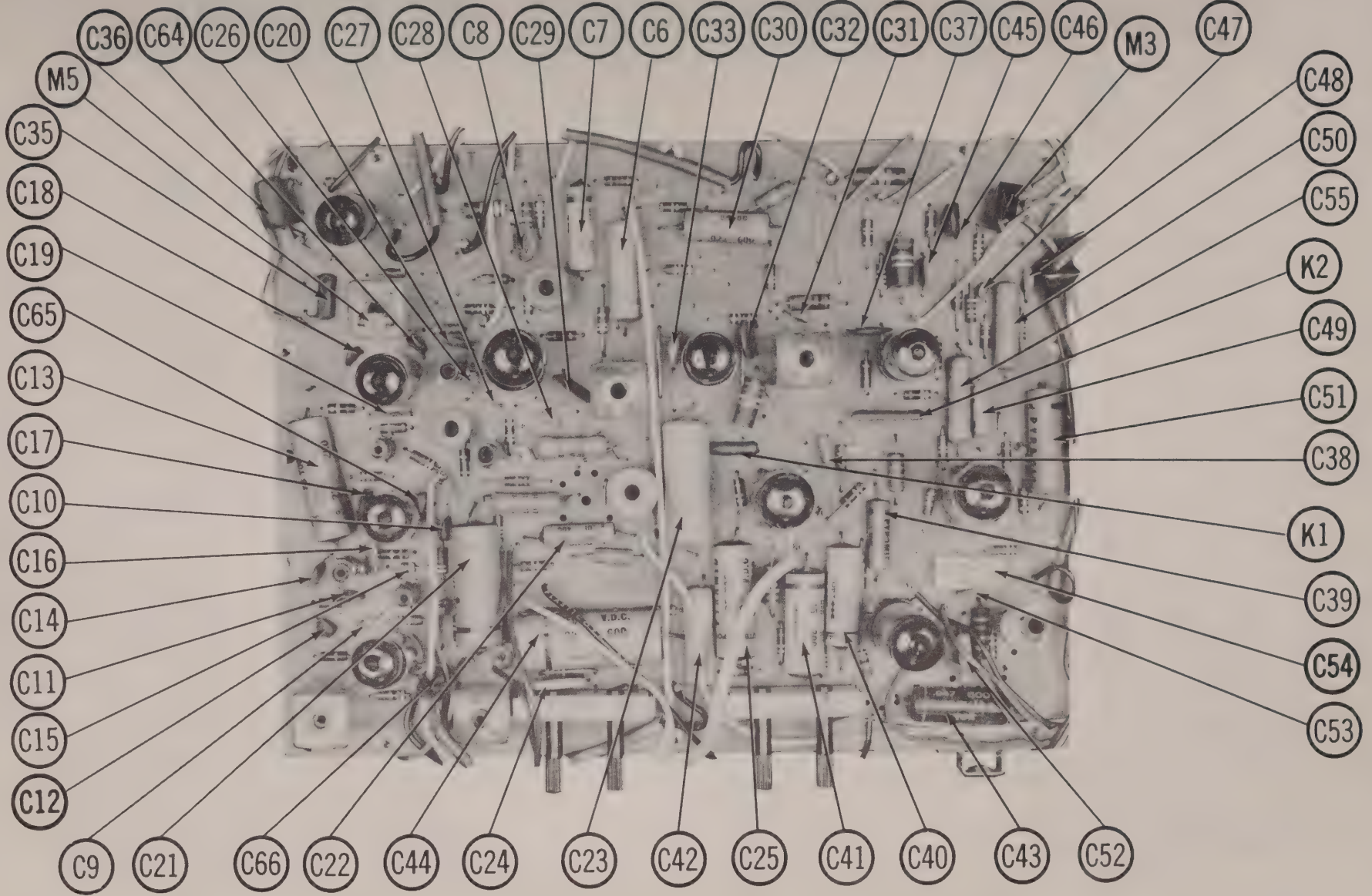
ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		Westinghouse PART No.	CBS PART No.	SYLVANIA PART No.	
M201	1N87G	296V002H02	1N60	1N60	Automatic Fine Tuning (Pigtail)



TUNER 470V019H04 - TOP VIEW



TUNER 470V019H04 - BOTTOM VIEW



PRINTED BOARD - CAPACITOR & MISC. IDENTIFICATION

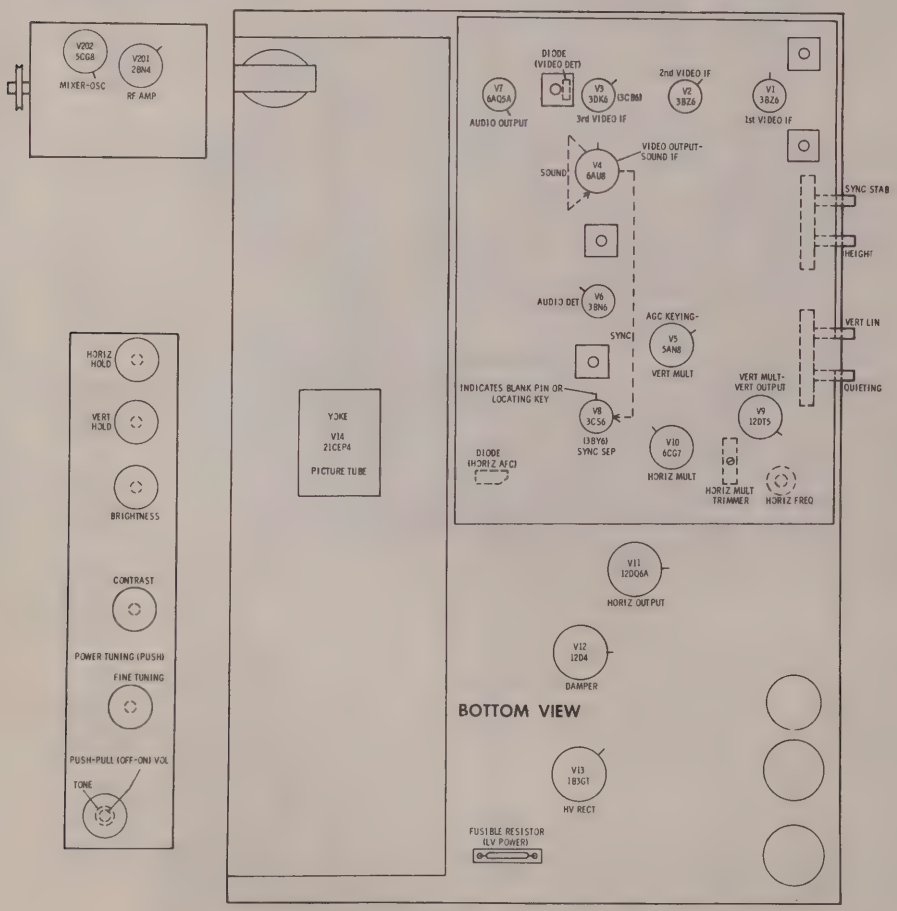
V-2376-1, V-2376-2

WESTINGHOUSE CHASSIS

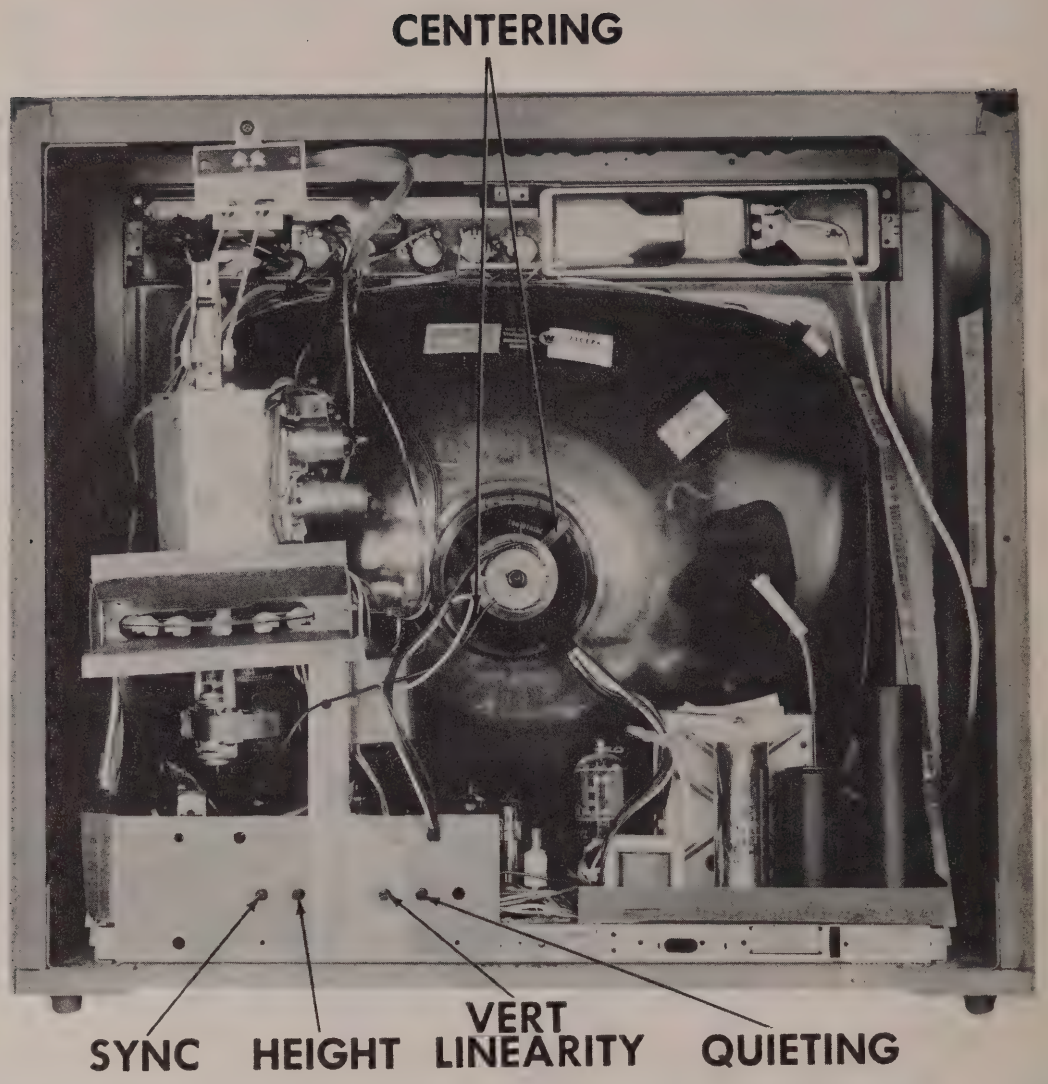
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BZ6	110K	47Ω	4.5Ω	5Ω	†2000Ω	†2000Ω	0Ω		
V2	3BZ6	110K	27Ω	5Ω	5.5Ω	†2000Ω	†2000Ω	0Ω		
V3	3DK6	.1Ω	150Ω	5.5Ω	6Ω	†2000Ω	†2000Ω	0Ω		
V4	6AU8	0Ω	100K	†2000Ω	10.5Ω	9Ω	10Ω	3900Ω	● †2500Ω	†5400Ω
V5	5AN8	● †5meg	● 1.6meg	0Ω	9Ω	8Ω	660K	†20Ω	†23K	†12K
V6	3BN6	320Ω	.5Ω	10.5Ω	11.5Ω	†22K	7.5Ω	†1meg		
V7	6AQ5A	0Ω	330Ω	8Ω	6Ω	†1300Ω	†820Ω	0Ω		
V8	3CS6	50K	0Ω	11.5Ω	12.5Ω	†100K	†11K	2.2meg		
V9	12DT5	†27K	NC	● 1.3meg	15Ω	12.5Ω	●1.3meg	47Ω	NC	†560Ω
V10	6CG7	†56K	● 210K	1000Ω	1.5Ω	0Ω	†47K	2.3meg	1000Ω	0Ω
V11	12DQ6A	NC	18Ω	NC	†13K	470K	NC	15Ω	0Ω	TOP CAP †20Ω
V12	12D4	NC	NC	¶5meg	NC	†21Ω	NC	21Ω	18Ω	
V13	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP †610Ω
V14	21CEP4	1.5Ω	150K	†2.2meg	†1500Ω	NC	150K	●180K	3Ω	
V201	2BN4	0Ω	2.2meg	3Ω	3.5Ω	†2500Ω	0Ω	2.2meg		
V202	5CG8	2700Ω	†5400Ω	0Ω	4.5Ω	3.5Ω	†2500Ω	†11K	0Ω	220K
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
■ THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM 275V SOURCE.
ǂ MEASURED FROM PIN 3 OF V12. NC NO CONNECTION.



TUBE PLACEMENT CHART



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Suggested Alignment Tools:
B1 .....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
B2 .....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

Connect a clip lead across the Horizontal Stabilizing coil (L17).

Set the Horizontal Hold (R6) to the center of its range.

Connect the DC probe of the VTVM to point Ⓔ. Common to chassis.

With the receiver tuned to a TV signal, adjust Horizontal Mult. Trimmer (B1) for zero volts on the VTVM. If zero can be approached, but not quite reached at one extreme of B1, it may be necessary to set the Horizontal Hold SLIGHTLY to one side of mid-range to obtain zero volts reading on the VTVM.

Remove the clip lead from L17.

Adjust the Horizontal Frequency slug (B2) for zero volts on the VTVM. Check the lock-in action by switching off channel and back again. The receiver should pull into synchronization on all channels. If not, repeat adjustments.

PHOTOFACT* Folder

EIA MEMBER

ALTEC LANSING
MODEL 345A

ALTEC LANSING
MODEL 345A

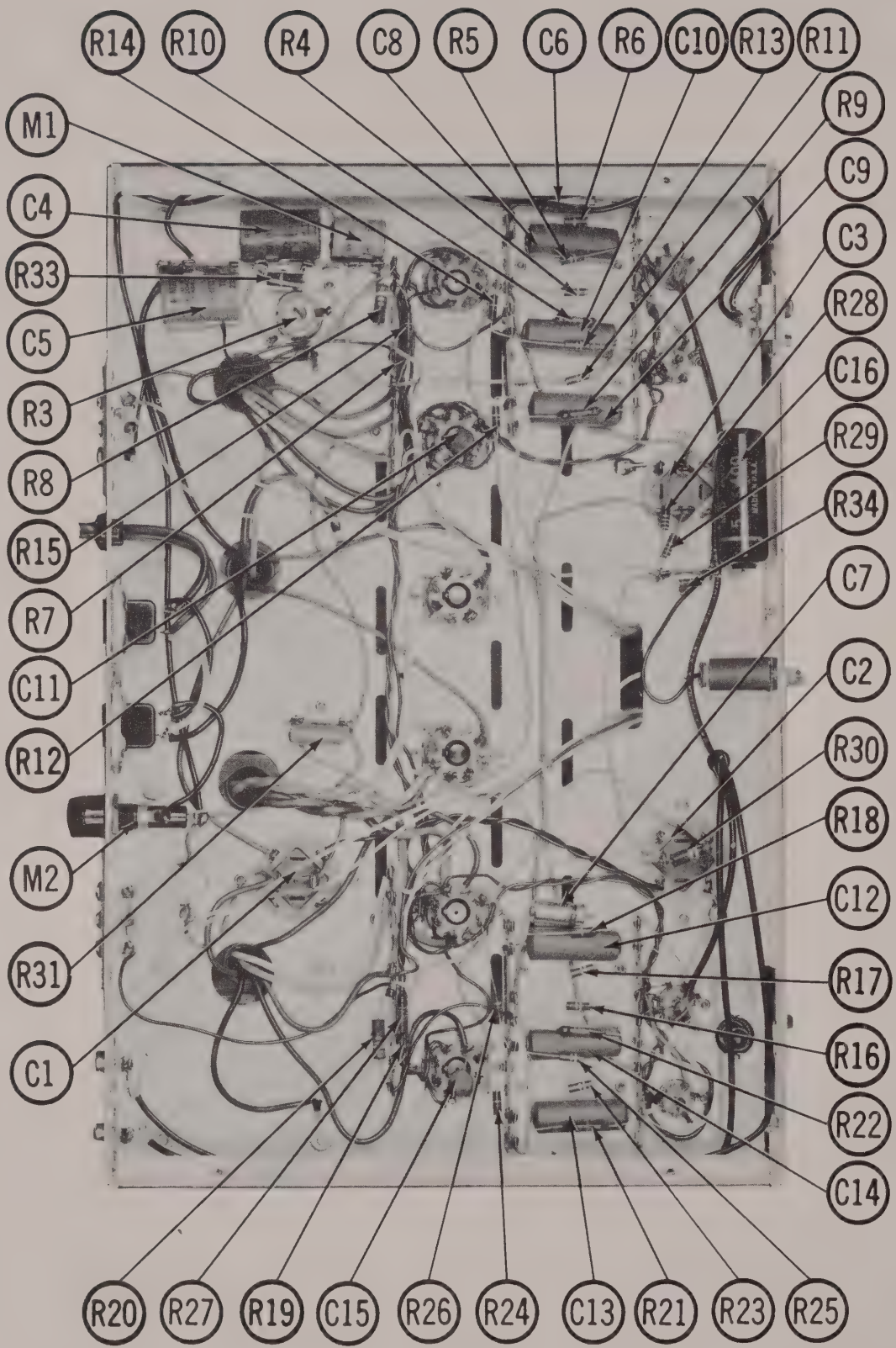
ALTEC LANSING
MODEL 345A

TRADE NAME	Altec Lansing Model 345A		
MANUFACTURER	Altec Lansing Corp., 1515 S. Manchester Ave., Anaheim, California		
TYPE SET	AC Operated 10 Tube Stereo Amplifier		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	200 Watts, 1.9 Amp. @ 117 Volts AC (No Signal) 240 Watts, 2.3 Amp. @ 117 Volts AC (Full Output)

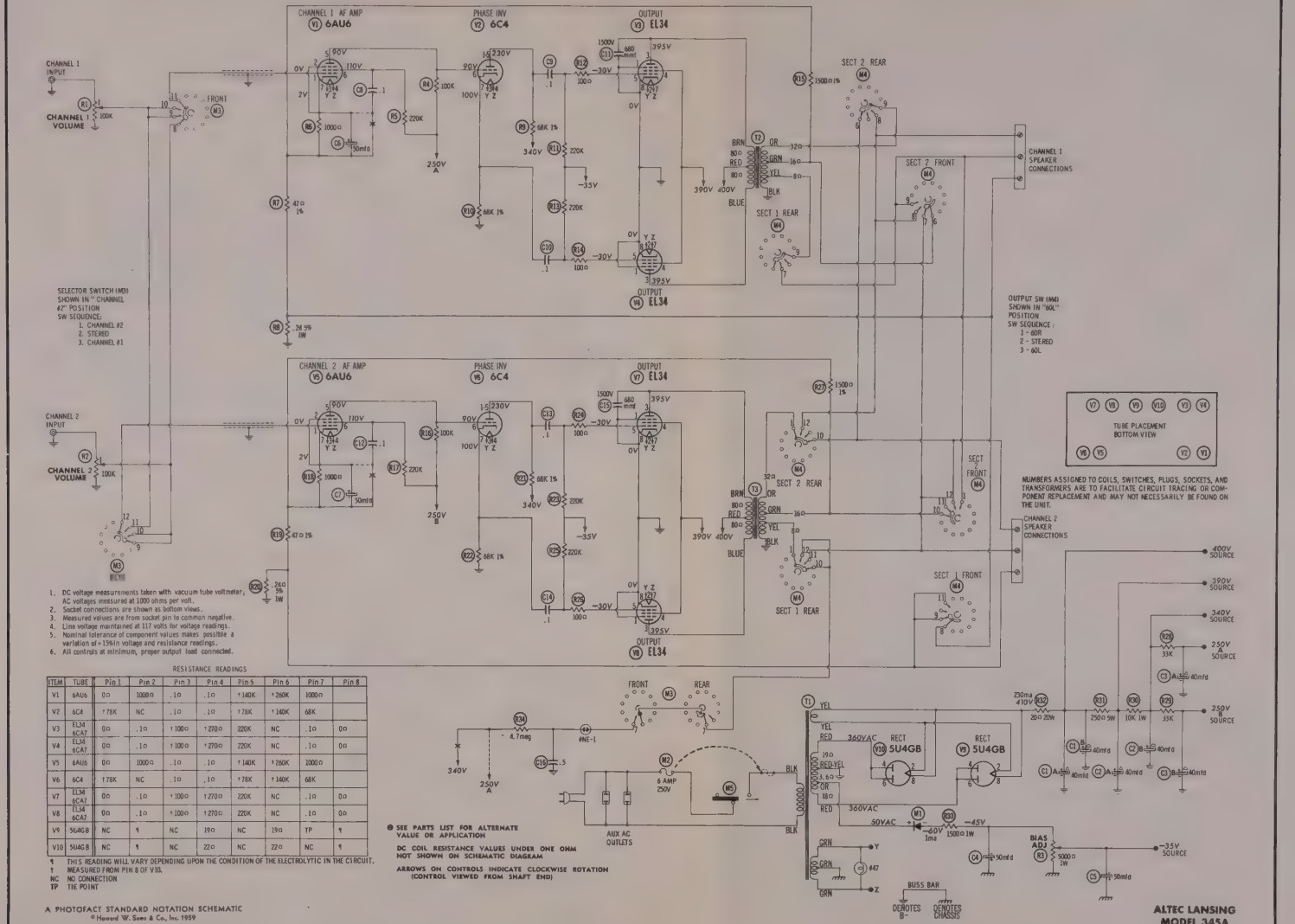
HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JV365



CHASSIS BOTTOM VIEW



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V1	6AU6	0Ω	1000Ω	.1Ω	.1Ω	†140K	†260K	1000Ω	
V2	6C4	†78K	NC	.1Ω	.1Ω	†78K	†140K	68K	
V3	EL34	0Ω	.1Ω	†100Ω	†270Ω	220K	NC	.1Ω	0Ω
V4	EL34	0Ω	.1Ω	†100Ω	†270Ω	220K	NC	.1Ω	0Ω
V5	6AU6	0Ω	1000Ω	.1Ω	.1Ω	†140K	†260K	1000Ω	
V6	6C4	†78K	NC	.1Ω	.1Ω	†78K	†140K	68K	
V7	EL34	0Ω	.1Ω	†100Ω	†270Ω	220K	NC	.1Ω	0Ω
V8	EL34	0Ω	.1Ω	†100Ω	†270Ω	220K	NC	.1Ω	0Ω
V9	5U4GB	NC	¶	NC	19Ω	NC	19Ω	TP	¶
V10	5U4GB	NC	¶	NC	22Ω	NC	22Ω	NC	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V10.
NC NO CONNECTION
TP TIE POINT

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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ALTEC LANSING MODEL 345A

ALTEC LANSING
MODEL 345A
CHASSIS-TOP VIEW

FOLDER 3

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE
V1	Channel 1 AF Amplifier	6AU6
V2	Channel 1 Phase Inverter	6C4
V3	Channel 1 Output	EL34/6CA7
V4	Channel 1 Output	EL34/6CA7
V5	Channel 2 AF Amplifier	6AU6
V6	Channel 2 Phase Inverter	6C4
V7	Channel 2 Output	EL34/6CA7
V8	Channel 2 Output	EL34/6CA7
V9	Rectifier	5U4GB
V10	Rectifier	5U4GB

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA Altec Lansing PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	500	20-10569	AFH2-72	B0530	FP288	TMD-62	TVL-2940	
B	▲40	500							
C2A	▲40	500	20-10569	AFH2-72	B0530	FP288	TMD-62	TVL-2940	
B	▲40	500							
C3A	▲40	500	20-10569	AFH2-72	B0530	FP288	TMD-62	TVL-2940	
B	▲40	500							
C4	50	50		PRS1350	BR505	TC39	TD-50-50	TVA-1308	
C5	50	50		PRS1350	BR505	TC39	TD-50-50	TVA-1308	
C6	50	3		SRE3V50	NLW50-3	TT6X50	ML50-3	TE-1058	
C7	50	3		SRE3V50	NLW50-3	TT6X50	ML50-3	TE-1058	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C8	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C9	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C10	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C11	680 1500V		HVD-15-680	DD30-681	HVB16T68	VCM-35-681M	2HV-368	30GA-T68
C12	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C13	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C14	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C15	680 1500V		HVD-15-680	DD30-681	HVB16T68	VCM-35-681M	2HV-368	30GA-T68
C16	.5 400V		P488N-5		CUB4P5		GEM-405	4TM-P5

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA Altec Lansing PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	100K	½	12669	B-41	A47-100K-Z	Q13-128	U39	Volume, Channel 1
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	100K	½	12669	B-41	A47-100K-Z	Q13-128	U39	Volume, Channel 2
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R3	5000Ω	1(WW)	12547					Bias Adjust

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	100K	
R5	220K	
R6	1000Ω	
R7	47Ω 1%	
R8	.24Ω 5% 1W	
R9	68K 1%	
R10	68K 1%	
R11	220K	
R12	100Ω	
R13	220K	
R14	100Ω	

ITEM No.	RATING	REMARKS
R15	1500Ω 1%	
R16	100K	
R17	220K	
R18	1000Ω	
R19	47Ω 1%	
R20	.24Ω 5% 1W	
R21	68K 1%	
R22	68K 1%	
R23	220K	
R24	100Ω	
R25	220K	

ITEM No.	RATING	REMARKS
R26	100Ω	
R27	1500Ω 1%	
R28	33K	
R29	33K	
R30	10K 1W	
R31	250Ω 5W	
R32	20Ω 20W	
R33	1500Ω 1W	
R34	4.7meg	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA Altec Lansing PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ 2.3A	720VCT @ .280A Tap @ 52V @ .006A	5V @ 6A	6.3VCT @ 7A							

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA Altec Lansing PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	3500Ω CT	32Ω Tap @ 16Ω, 8Ω								
T3	3500Ω CT	32Ω Tap @ 16Ω, 8Ω								

RECTIFIERS

ITEM No.	RATING CURRENT (Measured)	REPLACEMENT DATA Altec Lansing PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	NOTES
M1	.001A		1159 ①	D-5410 ①	026-4H-Q ①		① Selenium Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA Altec Lansing PART No. FUSE	Altec Lansing PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M2	3AG	6A 250V			312006 (3AG 6A 250V)	342001	MTH6	HKP

MISCELLANEOUS

ITEM No.	PART NAME	Altec Lansing PART No.	NOTES
M3	Switch		Input Selector (Rotary Wafer Type)
M4	Switch		Output Selector (Rotary Wafer Type)
M5	Switch		Off-On (SPDT Slide Type)

CABINETS & CABINET PARTS

When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder

EIA MEMBER

GROMMES
MODEL 24PG

GROMMES
MODEL 24PG

GROMMES
MODEL 24PG

TRADE NAME	Grommes Model 24PG
MANUFACTURER	Precision Electronics, Inc., 9101 King Ave., Franklin Park, Illinois
TYPE SET	AC Operated 10 Tube Stereo Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 105 Watts, 1.1 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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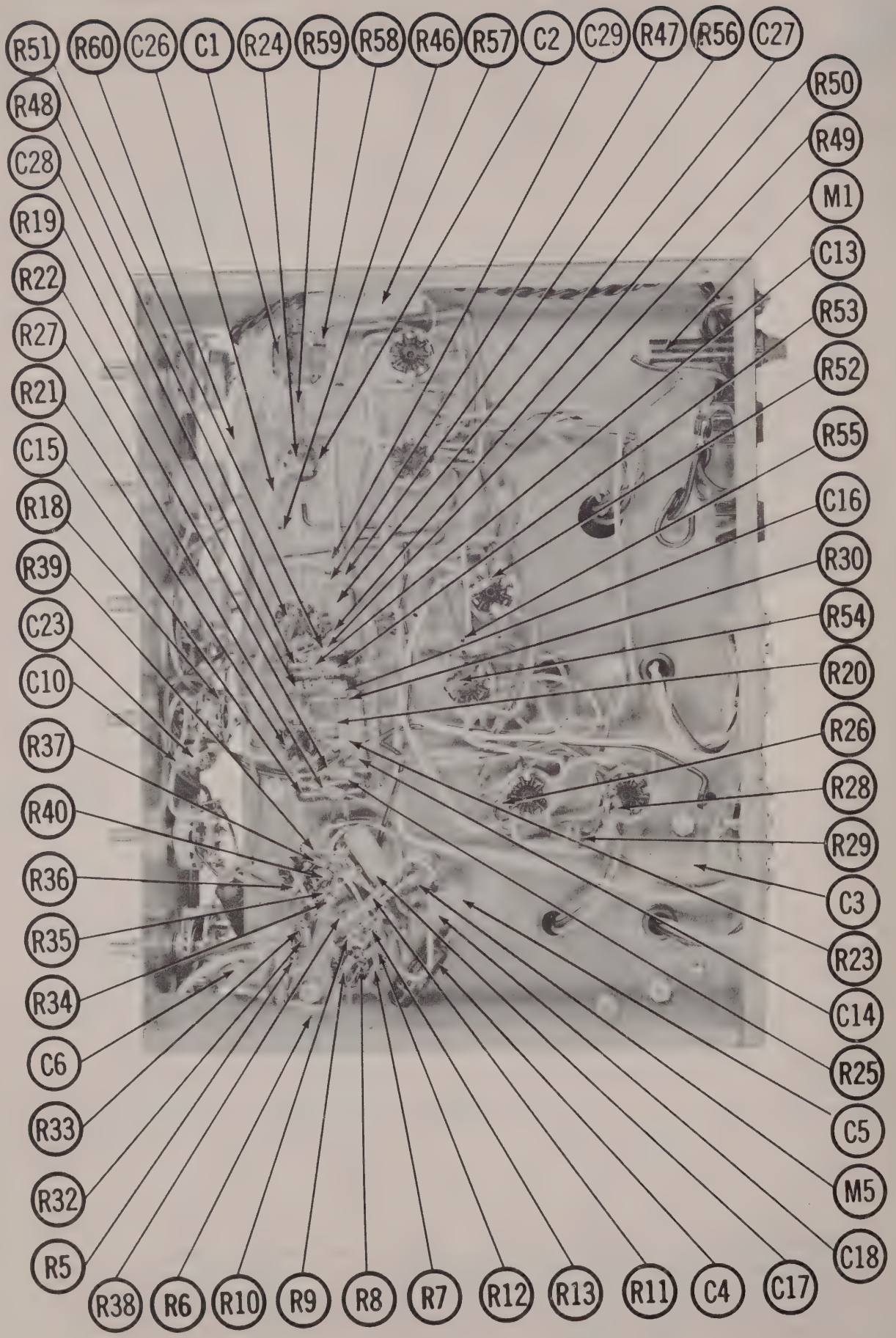
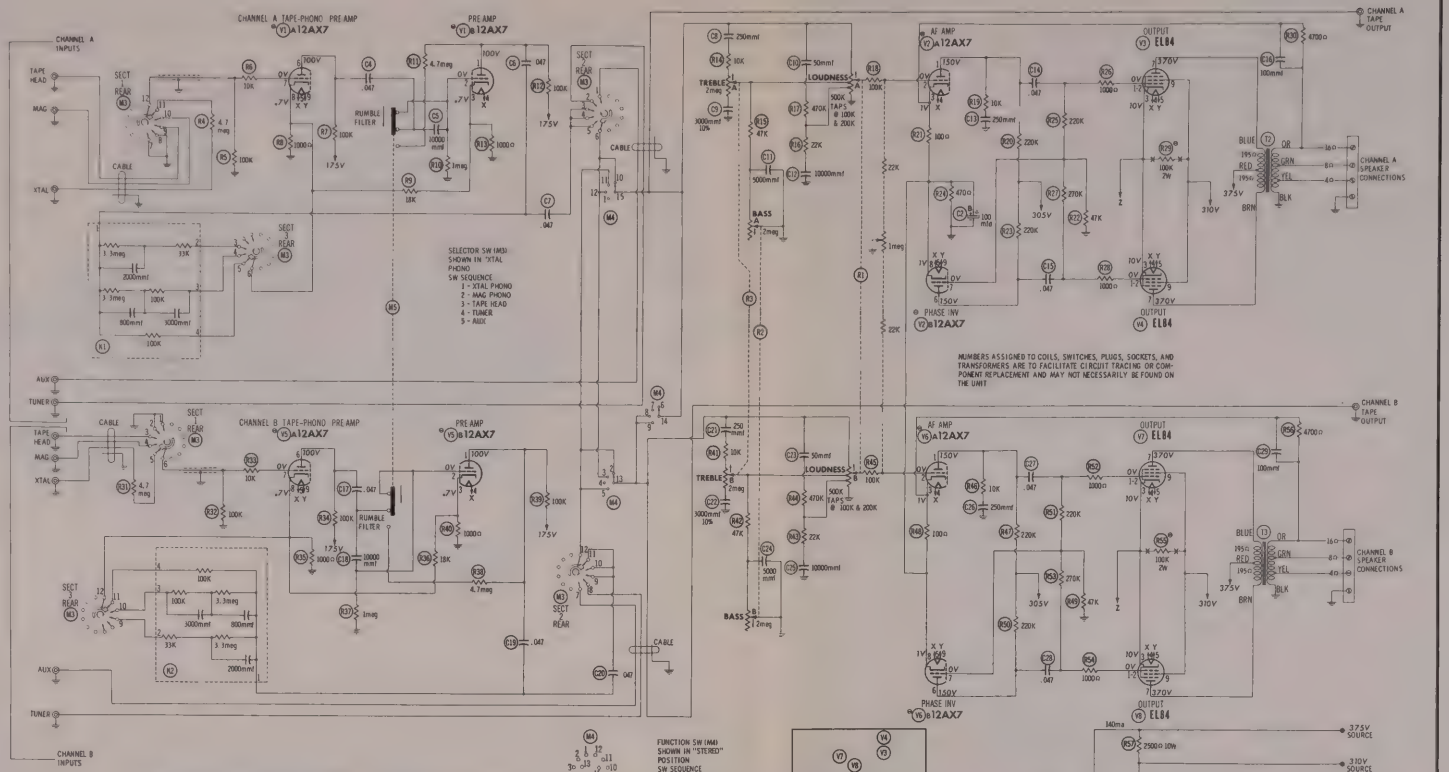
JV377



CHASSIS BOTTOM VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	↑150K	1meg	1000Ω	70Ω	70Ω	↑150K	110K	1000Ω	70Ω
V2	12AX7	↑220K	100K	470Ω	70Ω	70Ω	↑220K	47K	470Ω	70Ω
V3	EL84 6BQ5	270K	270K	70Ω	70Ω	70Ω	TP	↑195Ω	NC	↑2500Ω
V4	EL84 6BQ5	270K	270K	70Ω	70Ω	70Ω	TP	↑195Ω	NC	↑2500Ω
V5	12AX7	↑150K	1meg	1000Ω	70Ω	70Ω	↑150K	110K	1000Ω	70Ω
V6	12AX7	↑220K	100K	470Ω	70Ω	70Ω	↑220K	47K	470Ω	70Ω
V7	EL84 6BQ5	270K	270K	70Ω	70Ω	70Ω	TP	↑195Ω	NC	↑2500Ω
V8	EL84 6BQ5	270K	270K	70Ω	70Ω	70Ω	TP	↑195Ω	NC	↑2500Ω
V9	EZ80 6V4	40Ω	NC	¶	70Ω	70Ω	NC	37Ω	NC	NC
V10	EZ80 6V4	40Ω	NC	¶	70Ω	70Ω	NC	37Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
↑ MEASURED FROM PIN 3 OF V10.
NC NO CONNECTION
TP TIE POINT

⊕ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±5% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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GROMMES MODEL 24PG

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel A Tape, Phono, Preamplifier	12AX7 (7025) *	V6	Channel B AF Amp. – Channel B Phase Inverter	12AX7 (7025) *
V2	Channel A AF Amp. – Channel A Phase Inverter	12AX7 (7025) *	V7	Channel B Output	EL84/6BQ5
V3	Channel A Output	EL84/6BQ5	V8	Channel B Output	EL84/6BQ5
V4	Channel A Output	EL84/6BQ5	V9	Rectifier	EZ80/6V4
V5	Channel B Tape, Phono, Preamplifier	12AX7 (7025) *	V10	Rectifier	EZ80/6V4

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	GROMMES PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▬40	400		AFH4-78	D0640	FP429	TMQ-92	TVL-4734	①
B	■30	350							
C	▲10	300							
D	20	25		AFH3-156①	C1120	FP384.16	TMT-84	TVL-2708	
C2A	■10	250							
B	▲100	15		PRS50V50	BR505	TC39	TD-50-50	TVA-1308	
C3	50	50							

① Some versions may use a 3 section unit omitting C1D.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C6	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C7	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C8	250		DI-250	DD-251	L10T25	CCD-257	UC-5325	5GA-T25
C9	3000 10%		DI-3000		1R5D3	CCS-302	JL-3300	MS-23
C10	50		SI 50	D6-500	L10Q5	CCD-500	UC-545	5GA-Q50
C11	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C12	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C13	250		DI-250	DD-251	L10T25	CCD-251	UC-5325	5GA-T25
C14	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C15	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C16	100		SI 100	D6-101	L10T1	CCD-101	UC-531	5GA-T10
C17	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C18	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S1
C19	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C20	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C21	250		DI-250	DD-251	L10T25	CCD-251	UC-5325	5GA-T25
C22	3000 10%		DI-3000		1R5D3	CCS-302	JL-3300	MS-23
C23	50		SI 50	D6-500	L10Q5	CCD-500	UC-545	5GA-Q50
C24	5000		BPD-005	DD-250	BYA10D5	CCD-502	B-250	5HK-D50
C25	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C26	250		DI-250	DD-251	L10T25	CCD-251	UC-5325	5GA-T25
C27	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C28	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C29	100		SI 100	D6-101	L10T1	CCD-101	UC-531	5GA-T10

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	GROMMES PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	LCK-500K					Loudness, Channel A
B	100K & 200K taps 500K 100K & 200K taps	½						Loudness, Channel B
R2A	2meg	½	TCK-2MS	B-76	AD47-2meg-Z	Q13-139	† UE1847	Bass, Channel A
B	2meg	½		SR-76	Not Req.	M13-139		Bass, Channel B
C	Shaft			Not Req.	KSS-3	Not Req.		
R3A	2meg	½	TCK-2MS	B-76	AD47-2meg-Z	Q13-139	† UE1847	Treble, Channel A
B	2meg	½		SR-76	Not Req.	M13-139		Treble, Channel B
C	Shaft			Not Req.	KSS-3	Not Req.		

† "STA-LOC" Equivalent: FA26A, RU26A, CS3500.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	4.7meg	
R5	100K	
R6	10K	
R7	100K	
R8	1000Ω	
R9	18K	
R10	1meg	

ITEM No.	RATING	REMARKS
R11	4.7meg	
R12	100K	
R13	1000Ω	
R14	10K	
R15	47K	
R16	22K	
R17	470K	

ITEM No.	RATING	REMARKS
R18	100K	
R19	10K	
R20	220K	
R21	100Ω	
R22	47K	
R23	220K	
R24	470Ω	

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS (cont)

ITEM No.	RATING	REMARKS
R25	220K	
R26	1000Ω	
R27	270K	
R28	1000Ω	
R29	100K 2W	Note 1
R30	4700Ω	
R31	4. 7meg	
R32	100K	
R33	10K	
R34	100K	
R35	1000Ω	
R36	18K	

ITEM No.	RATING	REMARKS
R37	1meg	
R38	4. 7meg	
R39	100K	
R40	1000Ω	
R41	10K	
R42	47K	
R43	22K	
R44	470K	
R45	100K	
R46	10K	
R47	220K	
R48	100Ω	

ITEM No.	RATING	REMARKS
R49	47K	
R50	220K	
R51	220K	
R52	1000Ω	
R53	270K	
R54	1000Ω	
R55	100K 2W	Note 1
R56	4700Ω	
R57	2500Ω 10W	
R58	1000Ω 1W	
R59	47K 1W	
R60	70Ω 7W	

Note 1. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ② 1.1A	640VCT ② .140A	6.3VCT ② 5.5A	TP-13	22R06 ①			PM8422 ①	22R06 ①	R-16B ①

① Use original shields.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	GROMMES PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7200Ω CT	16Ω Taps② 8Ω, 4Ω	TO-10C	24S55	A-2904	AU-609	A-3830	24S55	S-28X	
T3	7200Ω CT	16Ω Taps② 8Ω, 4Ω	TO-10C	24S55	A-2904	AU-609	A-3830	24S55	S-28X	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	GROMMES PART No.	REPLACEMENT DATA
K1	Input Coupling	800mmf, 2000mmf, 3000mmf, 33K, 100K, 100K, 3. 3meg, 3. 3meg	PC-1960	
K2	Input Coupling	800mmf, 2000mmf, 3000mmf, 33K, 100K, 100K, 3. 3meg, 3. 3meg	PC-1960	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			GROMMES PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	3A 250V			312003 (3AG 3A 250V	342001	AGC3	HKP

MISCELLANEOUS

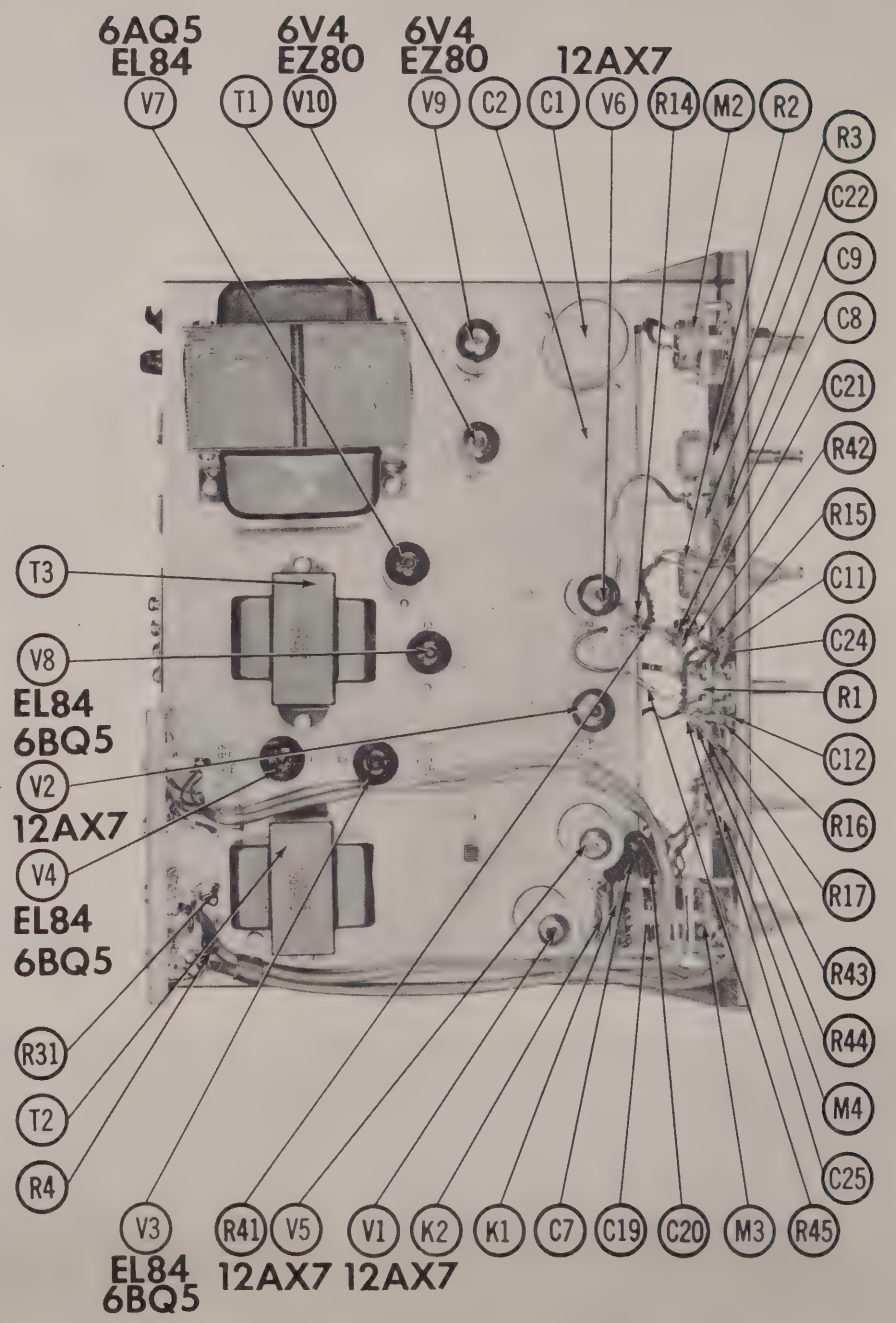
ITEM No.	PART NAME	GROMMES PART No.	NOTES
M2	Switch		Power, Off-On
M3	Switch		Selector
M4	Switch		Function
M5	Switch		Rumble Filter (DPDT Slide Type)

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—TOP VIEW

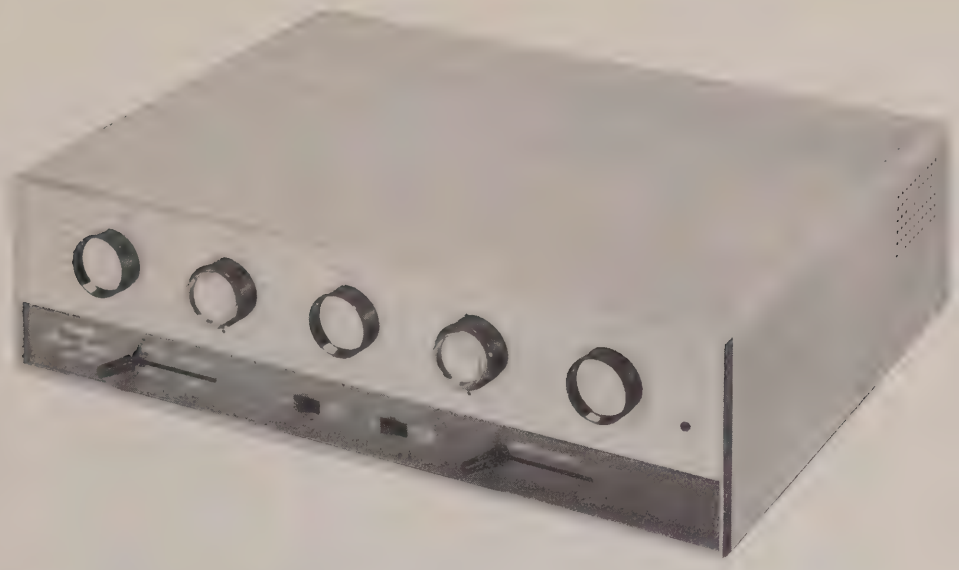


PHOTOFACT* Folder

EIA MEMBER

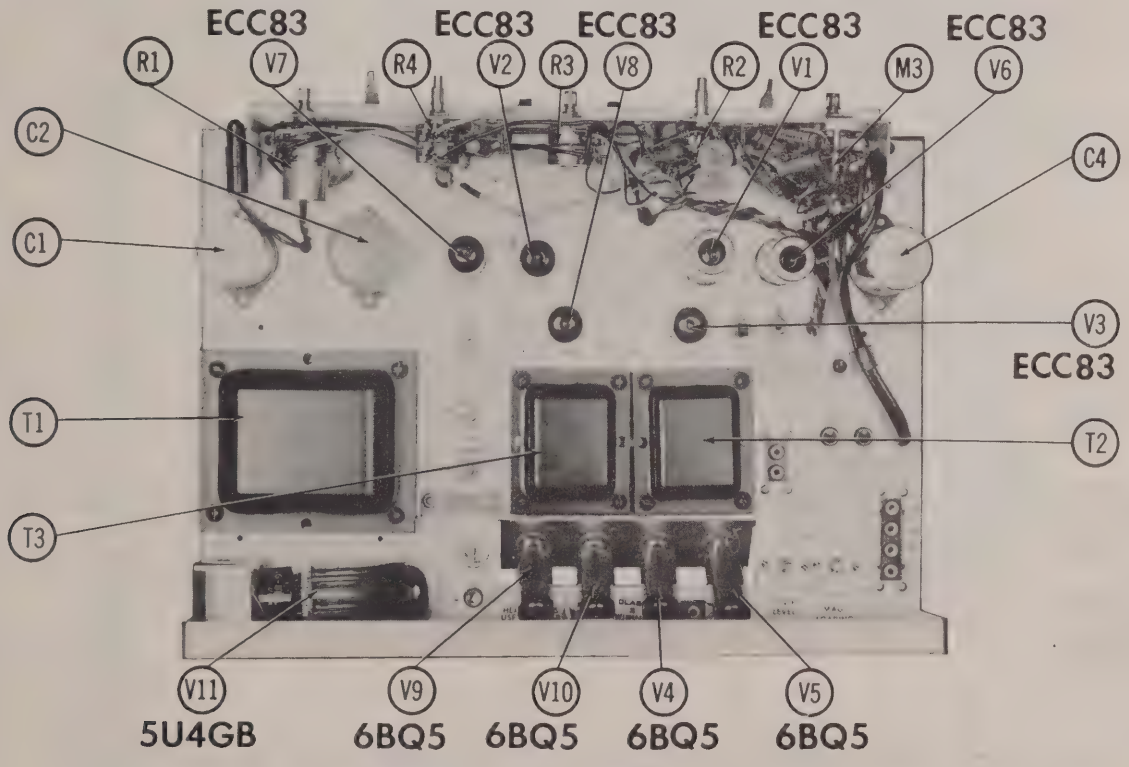
KNIGHT MODEL KN-734 (92SU422)

KNIGHT MODEL
KN-734 (92SU422)



TRADE NAME	Knight Model KN734 (92SU422)		
SUPPLIER	Allied Radio Corp., 100 N. Western Ave., Chicago 80, Illinois		
TYPE SET	AC Operated 11 Tube Stereo Amplifier		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	84 Watts, .85 Amp. @ 117 Volts AC (No Signal) 120 Watts, 1.15 Amp. @ 117 Volts AC (Full Output)

KNIGHT MODEL
KN-734 (92SU422)



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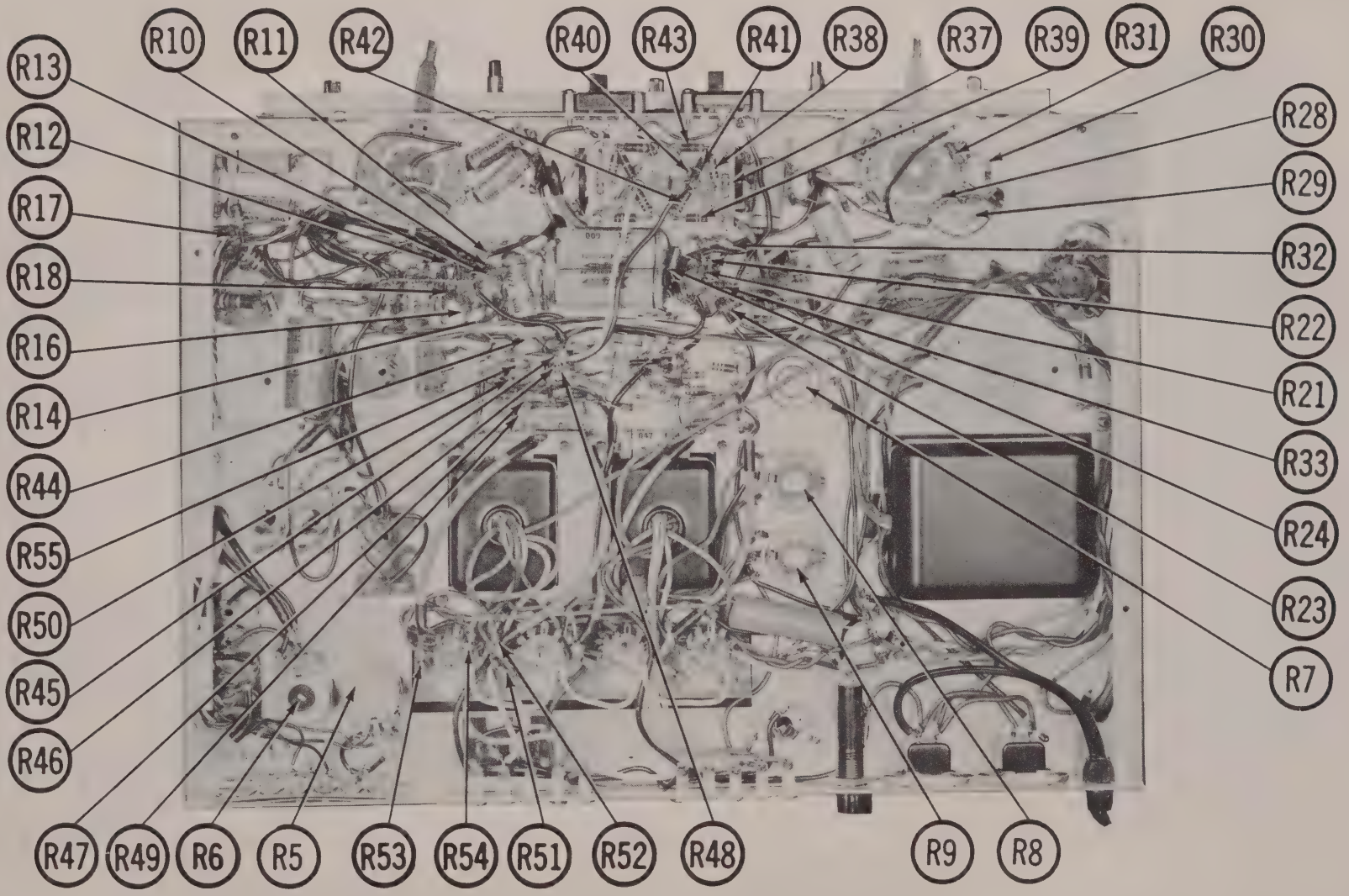
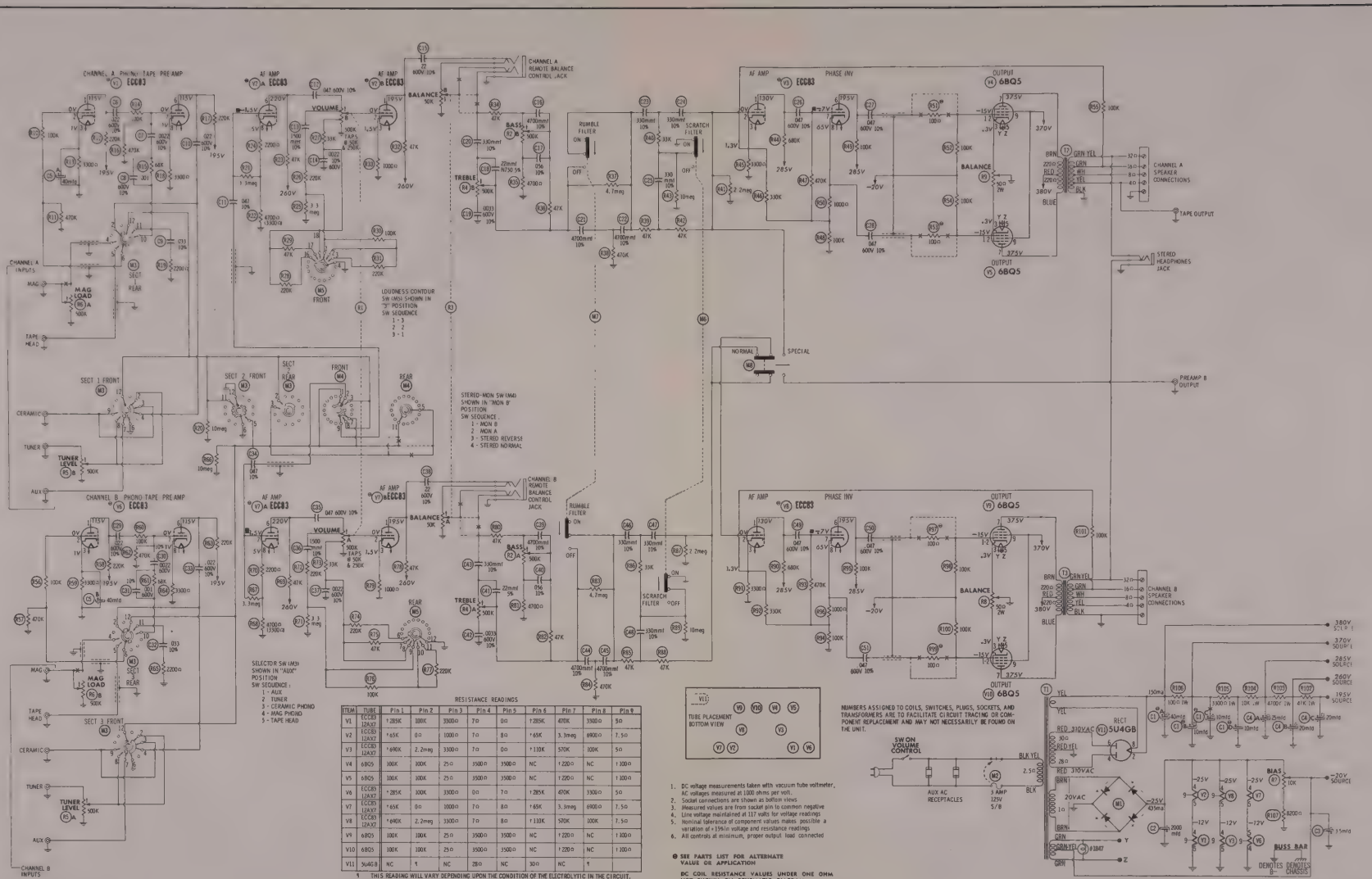
SET 465 FOLDER 5



CHASSIS BOTTOM VIEW – RESISTOR IDENT. (R5-R55)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 / 12AX7	↑285K	100K	3300Ω	7Ω	0Ω	↑285K	470K	330Ω	5Ω
V2	ECC83 / 12AX7	↑65K	0Ω	1000Ω	7Ω	8Ω	↑65K	3.3meg	690Ω	7.5Ω
V3	ECC83 / 12AX7	↑690K	2.2meg	3300Ω	7Ω	0Ω	↑110K	570K	100K	5Ω
V4	6BQ5	100K	100K	25Ω	3500Ω	3500Ω	NC	↑220Ω	NC	↑100Ω
V5	6BQ5	100K	100K	25Ω	3500Ω	3500Ω	NC	↑220Ω	NC	↑100Ω
V6	ECC83 / 12AX7	↑285K	100K	3300Ω	0Ω	7Ω	↑285K	470K	330Ω	5Ω
V7	ECC83 / 12AX7	↑65K	0Ω	1000Ω	7Ω	8Ω	↑65K	3.3meg	690Ω	7.5Ω
V8	ECC83 / 12AX7	↑690K	2.2meg	3300Ω	7Ω	8Ω	↑110K	570K	100K	7.5Ω
V9	6BQ5	100K	100K	25Ω	3500Ω	3500Ω	NC	↑220Ω	NC	↑100Ω
V10	6BQ5	100K	100K	25Ω	3500Ω	3500Ω	NC	↑220Ω	NC	↑100Ω
V11	5U4GB	NC	¶	NC	280Ω	NC	300Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
↑ MEASURED FROM PIN 2 OF V11. ■ MEASURED FROM CATHODE.
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE ROTATION (CONTROL VIEWED FROM SHAFT END)

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

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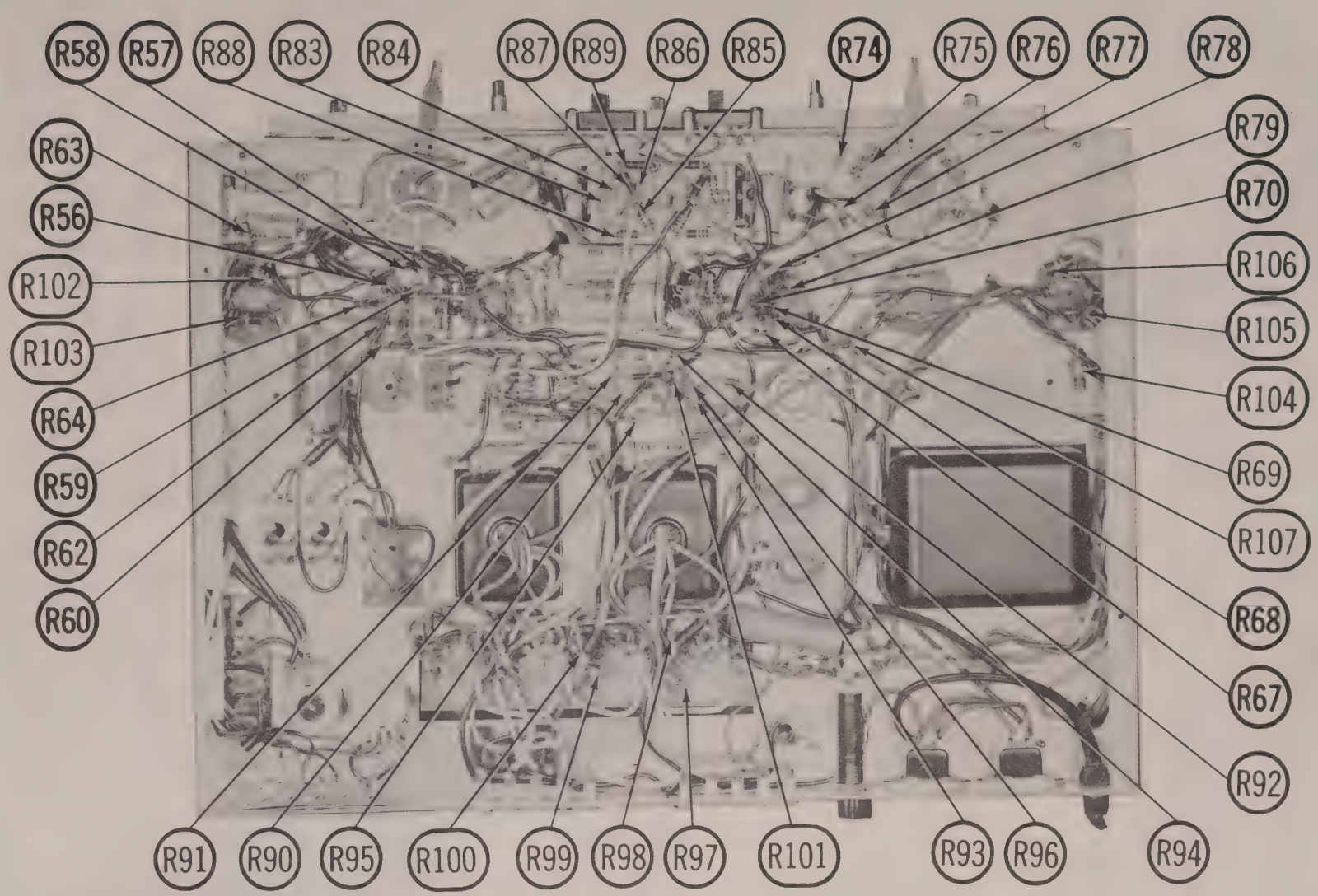
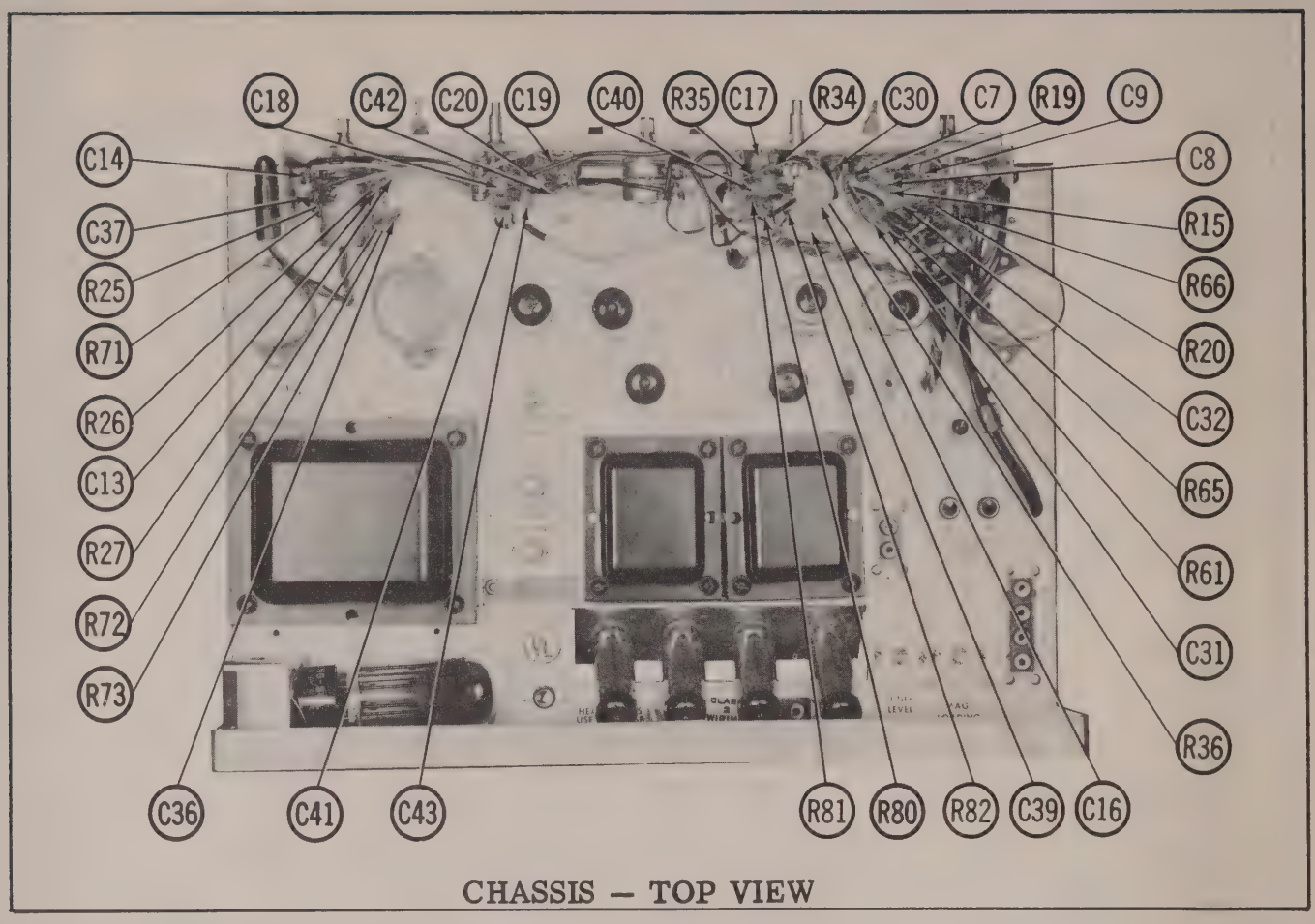
KNIGHT MODEL KN-734 (92SU422)

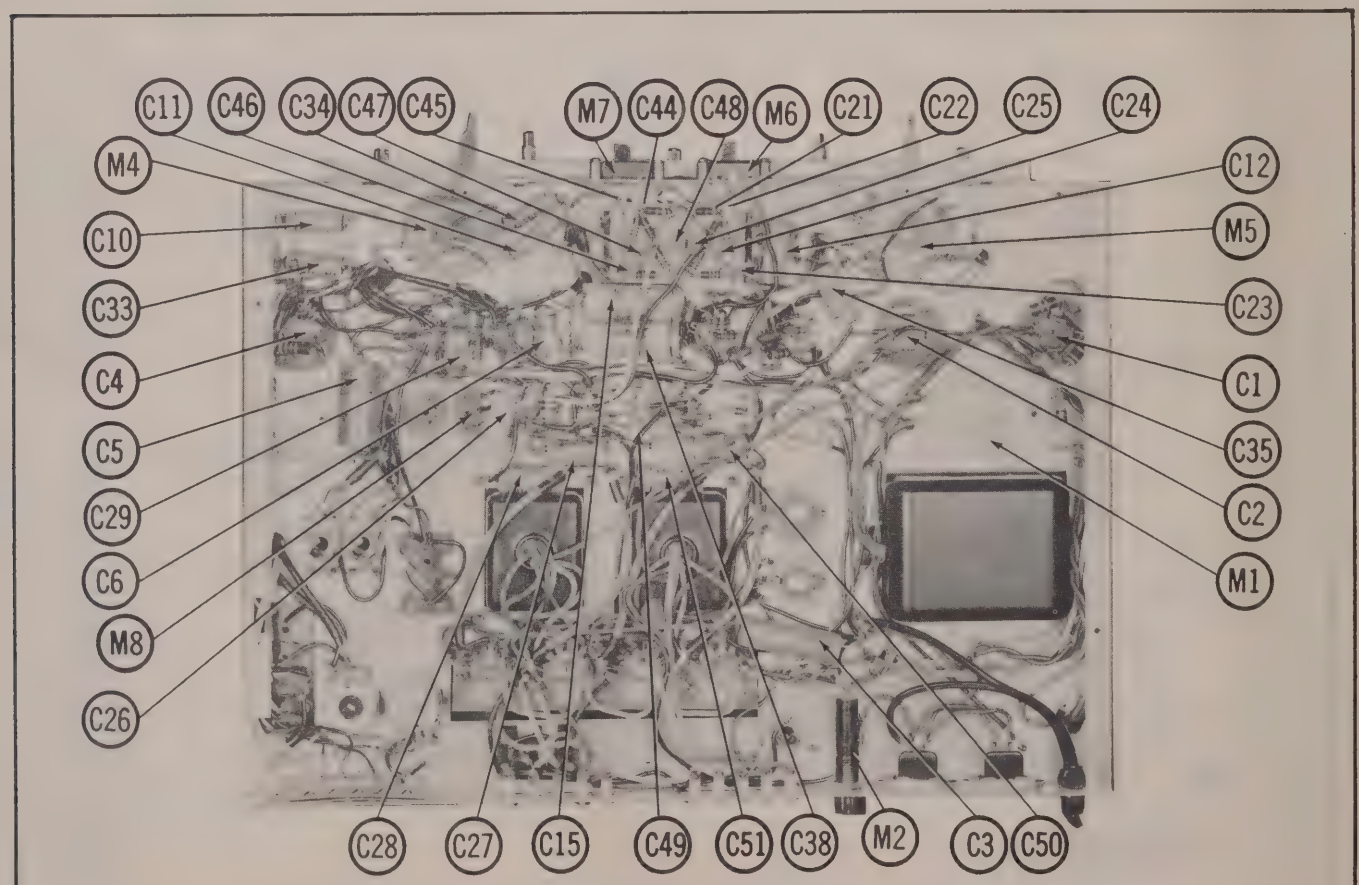


CHASSIS BOTTOM VIEW – RESISTOR IDENT. (R56-R107)

KNIGHT MODEL
KN-734 (92SU422)



CHASSIS — TOP VIEW



CHASSIS BOTTOM VIEW — CAPACITOR & MISC. IDENT.

PARTS LIST AND DESCRIPTIONS

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No. 1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Channel A Phono, Tape Pre-amplifier	ECC83/12AX7 (12DF7)*	V6	Channel B Phono, Tape Pre-amplifier	ECC83/12AX7 (12DF7)*
V2	Channel A AF Amplifier	ECC83/12AX7 (12DF7)*	V7	Channel B AF Amplifier	ECC83/12AX7 (12DF7)*
V3	Channel A AF Amplifier-Channel A Phase Inverter	ECC83/12AX7 (12DF7)*	V8	Channel B AF Amplifier-Channel B Phase Inverter	ECC83/12AX7 (12DF7)*
V4	Channel A Output	6BQ5	V9	Channel B Output	6BQ5
V5	Channel A Output	6BQ5	V10	Channel B Output	6BQ5
			V11	Rectifier	5U4GB

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	KNIGHT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	450	CE-706	AFH4-17	D0160	FP475.5	TMQ-17	TVL-4771.3	①
B	■10	450							
C	▲10	450							
D	10	450							
C2	2000	30	CE-208						
C3	35	50	CE-406K	PRS1470	BR505	TC48	TD-40-150	TVLS-1250 *	
C4A	▲25	350	CE-656	AFH3-37	C0280	FP376.5	TMQ-55	TE-1306	
B	▲20	350						TVL-3781	
C	■20	300							
C5A	40	25	CE-806H	PRS2195	BBRD4415	TCD48	TDLD-7	TVA-2445	
B	40	25							

① Some versions may use 40-20-10 mfd @ 450V combining C1B and C1C.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	.022 600V 10%		V84C6S22 10%		PM6S22	6DP-2-223	GTM-6122	6TM-S22
C7	.0022 600V 10%		V84C6D22 10%		PM6D22	6DP-1-222	GTM-6222	6TM-D22
C8	.001 600V 10%		V84C6D1 10%	DD-102	PM6D1	6DP-1-102	GTM-621	6TM-D1
C9	.033 200V 10%		V84C2S33 10%		PM6S33	4DP-2-333	GTM-2133	6TM-S33
C10	.022 600V 10%		V84C6S22 10%		PM6S22	6DP-2-223	GTM-6122	6TM-S22
C11	.047 200V 10%		V84C2S47 10%		PM2S47	4DP-3-473	GTM-2147	2TM-S47
C12	.047 600V 10%		V84C6S47 10%		PM6S47	6DP-3-473	GTM-6147	6TM-S47
C13	1500 10%		DI-1500	DD-152	PM6D15	CCS-152	JL-215	10TS-D15
C14	.0022 600V 10%		V84C6D22 10%		PM6D22	6DP-1-222	GTM-6222	6TM-D22
C15	.22 600V 10%		V84C6P22 10%		PM6P22	6DP-5-224	GTM-6022	6TM-P22
C16	4700 10%		DI-4700 10%		PM6D47	CCS-472	JL-247	10TS-D47
C17	.056 200V 10%		P684CM-057			4DP-3-563	GTM-6156	2WF-S56
C18	22 N750 5%			DTN-22	C10Q22U	CCTN-220	CN7-422	10TCU-Q22
C19	.0033 600V 10%		V84C6D33 10%		PM6D33	6DP-1-332	GTM-6233	6TM-D33
C20	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C21	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C22	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C23	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C24	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C25	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C26	.047 600V 10%		V84C6S47 10%		PM6S47	6DP-3-473	GTM-6147	6TM-S47
C27	.047 600V 10%		V84C6S47 10%		PM6S47	6DP-3-473	GTM-6147	6TM-S47
C28	.047 600V 10%		V84C6S47 10%		PM6S47	6DP-3-473	GTM-6147	6TM-S47
C29	.022 600V 10%		V84C6S22 10%		PM6S22	6DP-2-223	GTM-6122	6TM-S22
C30	.0022 600V 10%		V84C6D22 10%		PM6D22	6DP-1-222	GTM-6222	6TM-D22
C31	.001 600V 10%		V84C6D1 10%		PM6D1	6DP-1-102	GTM-621	6TM-D1
C32	.033 200V 10%		V84C2S33 10%		PM6S33	4DP-2-333	GTM-2133	6TM-S33
C33	.022 600V 10%		V84C6S22 10%		PM6S22	6DP-2-223	GTM-6122	6TM-S22
C34	.047 200V 10%		V84C2S47 10%		PM2S47	4DP-3-473	GTM-2147	2TM-S47
C35	.047 600V 10%		V84C6S47 10%		PM6S47	6DP-3-473	GTM-6147	6TM-S47
C36	1500 10%		DI-1500	DD-152	PM6D1	CCS-152	JL-215	10TS-D15
C37	.0022 600V 10%		V84C6D22 10%		PM6D22	6DP-1-222	GTM-6222	6TM-D22
C38	.22 600V 10%		V84C2P22 10%		PM6D22	6DP-5-224	GTM-6022	6TM-P22
C39	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C40	.056 200V 10%		P684CM-057			4DP-3-563	GTM-6156	2WF-S56
C41	22 N750 5%			DTN-22	C10Q22U	CCTN-220 *	CN7-422	10TCU-Q22
C42	.0033 600V 10%		V84C6D33 10%		PM6D33	6DP-1-332	GTM-6233	6TM-D33
C43	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C44	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C45	4700 10%		DI-4700		PM6D47	CCS-472	JL-247	10TS-D47
C46	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C47	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C48	330 10%		DI-330	DD-331	L10T33	CCD-331	JL-333	10TS-T33
C49	.047 600V 10%		V84C6S47 10%		PM6S47	4DP-3-473	GTM-6147	6TM-S47
C50	.047 600V 10%		V84C6S47 10%		PM6S47	4DP-3-473	GTM-6147	6TM-S47
C51	.047 600V 10%		V84C6S47 10%		PM6S47	4DP-3-473	GTM-6147	6TM-S47

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	KNIGHT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K *	½	RP-105AH					Volume, Channel B
B	500K *	½						Volume, Channel A
C	Switch							Power Off-On
R2A	500K	½	RP-105AG					Bass, Channel B
B	500K	½						Bass, Channel A
R3A	50K	½	RP-104X					Balance, Channel B
B	50K	½						Balance, Channel A
R4A	500K	½	RP-105AG					Treble, Channel B
B	500K	½						Treble, Channel A
R5A	500K	½	RP-105AJ	F1-41		■ QJ-1110R	▲ UE4030	Tuner Level, Channel B
B	500K	½		R2-41				Tuner Level, Channel A
R6A	500K	½	RP-105AK	AB-60	AD47-500K-Z	Q13-133 †		Mag Load, Channel A
B	500K	½		SR-60	Not Req.	M13-133	▲ UE1398 †	Mag Load, Channel B
C	Shaft			AK-1	FKS-1/4	Not Req.		
R7A	10K	½	RP-103E-H	AB-14	A47-10K-S	B11-116	U-20	Output Tube Bias
B	Shaft			AK-1	FKS-1/4	SK-1	Not Req.	
R8A	50Ω	2(WW)	RPW-500B	WN-500	A43-50	WPK-50	R50L	Output Tube Balance, Chan. B
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	
R9A	50Ω	2(WW)	RPW-500B	WN-500	A43-50	WPK-50	R50L	Output Tube Balance, Chan. A
B	Shaft			Not Req.	FKS-1/4	Not Req.	Not Req.	

* Taps @ 50K and 250K.
† Ream mounting hole.
■ "Concentrikit" Equivalent: K-2 Kit with base elements and shafts: B13-133, P9-018 (Panel) B13-133, R11-028 (Rear)
Not available as a factory assembled unit.
▲ "STA-LOC" Equivalent: FA55A, RU55A, OK625, IK875.
● "STA-LOC" Equivalent: FA55A, RU55A, CS3500.

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R10	100K	
R11	470K	
R12	220K	
R13	3300Ω	
R14	100K	
R15	68K	
R16	470K	
R17	220K	
R18	3300Ω	
R19	2200Ω	
R20	10meg	
R21	3.3meg	
R22	4700Ω	(3300Ω)*
R23	47K	
R24	2200Ω	
R25	3.3meg	
R26	220K	
R27	33K	
R28	220K	
R29	47K	
R30	100K	
R31	220K	
R32	47K	
R33	1000Ω	
R34	47K	
R35	4700Ω	
R36	47K	
R37	4.7meg	
R38	470K	
R39	47K	
R40	33K	
R41	2.2meg	
R42	47K	

ITEM No.	RATING	REMARKS
R43	10meg	
R44	680K	
R45	3300Ω	
R46	330K	
R47	470K	
R48	100K	
R49	100K	
R50	1000Ω	
R51	100Ω	Note 1
R52	100K	
R53	100Ω	Note 1
R54	100K	
R55	100K	
R56	100K	
R57	470K	
R58	220K	
R59	3300Ω	
R60	100K	
R61	68K	
R62	470K	
R63	220K	
R64	3300Ω	
R65	2200Ω	
R66	10meg	
R67	3.3meg	
R68	4700Ω	(3300Ω)*
R69	47K	
R70	2200Ω	
R71	3.3meg	
R72	220K	
R73	33K	
R74	220K	
R75	47K	

ITEM No.	RATING	REMARKS
R76	100K	
R77	220K	
R78	47K	
R79	1000Ω	
R80	47K	
R81	4700Ω	
R82	47K	
R83	4.7meg	
R84	470K	
R85	47K	
R86	33K	
R87	2.2meg	
R88	47K	
R89	10meg	
R90	680K	
R91	3300Ω	
R92	330K	
R93	470K	
R94	100K	
R95	100K	
R96	1000Ω	
R97	100Ω	Note 1
R98	100K	
R99	100Ω	Note 1
R100	100K	
R101	100K	
R102	47K 1W	
R103	4700Ω 1W	
R104	10K 1W	
R105	3300Ω 1W	
R106	100Ω 1W	
R107	8200Ω	

* Alternate

Note 1. Not used in some versions.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
				KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
	PRI.	SEC. 1	SEC. 2							
T1	117V @ 1.15A	620VCT @ .150A	5V @ 3A	LP-0278						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VCT @ 3.2A	20V @ .460A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
			KNIGHT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
	PRI.	SEC.								
T2	6400Ω CT	32Ω Taps @ 16Ω, 8Ω, 4Ω	LO-0160							
T3	6400Ω CT	32Ω Taps @ 16Ω, 8Ω, 4Ω	LO-0160							

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	KNIGHT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.435A	JR-0030A ①	1017 ①	D-6194 ①	604B ①		① Selenium Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			KNIGHT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	3A 125V S/B			313003 (3AG 3A 125V S/B)	341001	MDL3	HKP

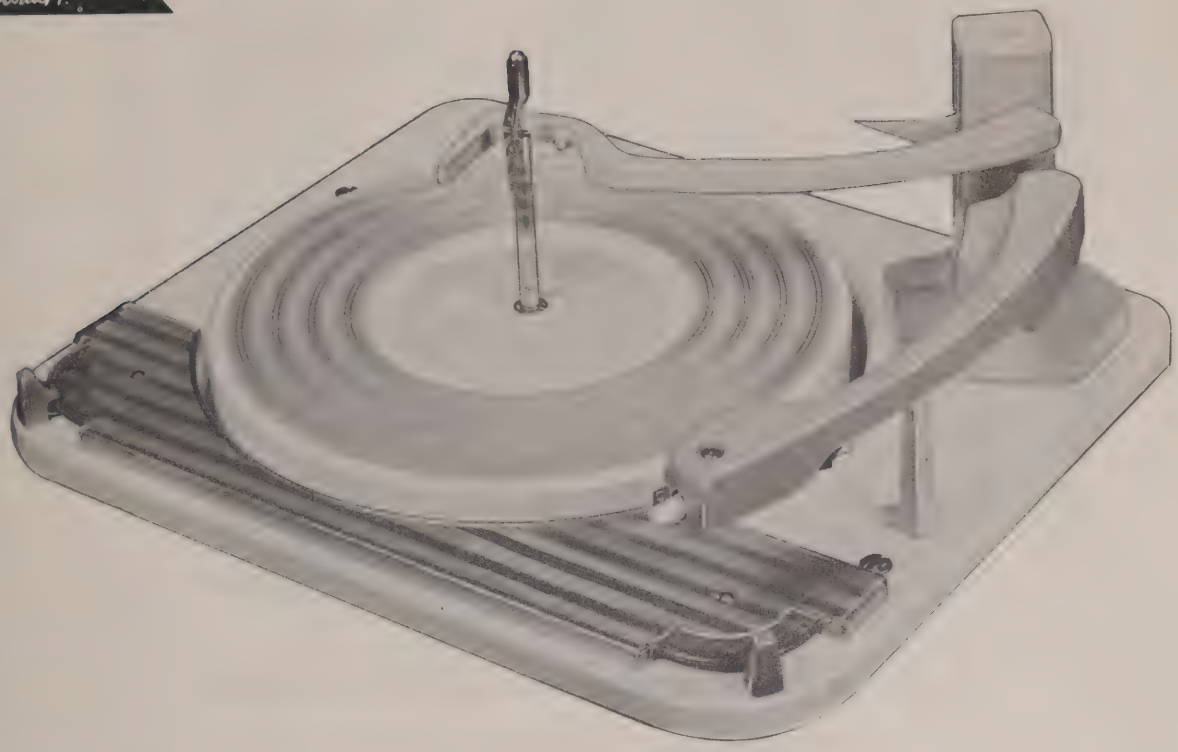
MISCELLANEOUS

ITEM No.	PART NAME	KNIGHT PART No.	NOTES
M3	Switch	X0372	Selector
M4	Switch	X0371	Stereo-Monaural
M5	Switch	X0370	Loudness Contour
M6	Switch		Scratch Filter (DPDT Slide Type)
M7	Switch		Rumble Filter (DPDT Slide Type)
M8	Switch		Normal-Special (Pre-Amp. Output) (DPDT Slide Type)

CABINETS & CABINET PARTS

When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color

PHOTOFACT* Folder



MONARCH
MODEL UA12

MONARCH
MODEL UA12

GENERAL INFORMATION

Monarch Model UA12 record changers play a stack of records in automatic sequence and shut off after the last record has been played. The only manual adjustment necessary is to turn the pickup to the "78" or "L. P." Position and rotate the speed Control knob to the desired speed.

To play records with a large center hole, put on the special 45-rpm spindle (available as an accessory.) Be certain the spindle is properly engaged.

After the last record of a stack has been played, the pickup arm will return to its rest post, and the changer will shut off automatically.

Connect this record changer to an AC supply only. It is adapted for 110 to 120 volts, 60 cycles.

Imported by:

Dicus (USA) Inc.
115-10 14th Road
College Point 56
N. Y.

Manufactured by:

Birmingham Sound Reproducers, Ltd.
Monarch Works
Old Hill, Staffs
England

This material compiled and published by

HOWARD W. SAMS & CO., INC., INDIANAPOLIS 6, INDIANA

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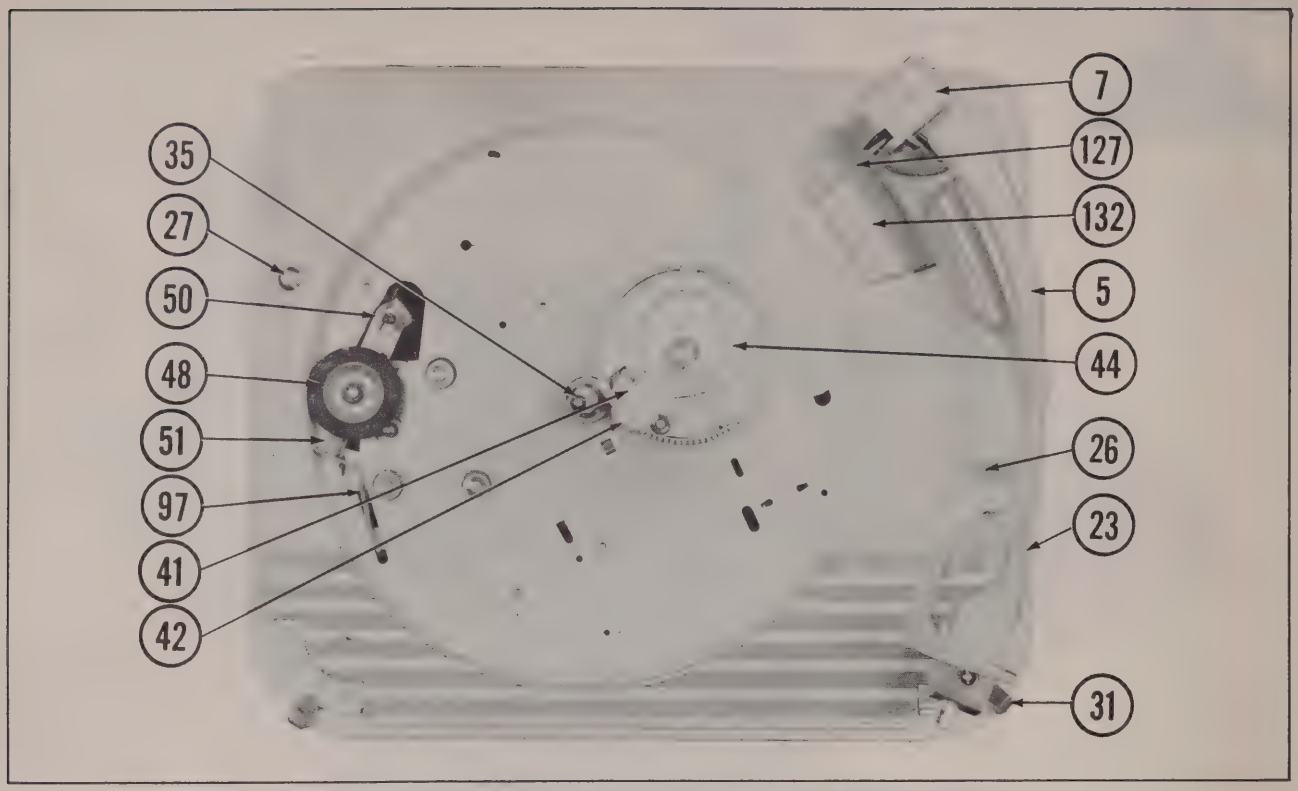


FIG. 1 TOP VIEW OF MECHANISM WITH TURNTABLE REMOVED

PREPARING FOR OPERATION

1. Remove safety guard from needle.
2. Unclip pickup arm by lifting it clear and replacing it lightly on top of rest post.
3. Turn needle, cartridge, and Speed Selector knob for type of records to be played.

OPERATING INSTRUCTIONS

Loading

Grasp control arm (5) at the rear, lift it, and swing clear of the records. Place records on the center spindle (not to exceed ten 12 - or 10 -inch or twelve 7-inch). Then place control arm (5) back on top of records.

NOTE: Intermixed records must be the same speed and have the same type of groove.

Starting

Be sure the stylus and speed controls are in the position corresponding to the type of records to be played. Move the On-Off-Reject lever fully to the right, and release. The lever will return to the On position, and the changer will start to cycle.

Rejecting

To reject a record, move the On-Off-Reject lever fully to the right. The changer will cycle and play the next record.

Manual Operation

To play one record at a time, follow this procedure:

Place the record on the turntable. Place control arm (5) in its operating position. Turn On-Off-Reject lever to the Manual position. The turntable will revolve at the speed selected. Lift the pickup arm from its rest post and place it on the record. The record will now play. When the record has finished, the pickup arm will return to the rest post, and the changer will shut off.

To Remove The Records

Lift control arm (5) and turn it out of the way before removing the records from the center spindle.

Stopping

The record changer may be stopped at any time by turning the On-Off-Reject lever to the Off position. Allow the pickup to return to the rest post before lifting control arm (5) or removing the records.

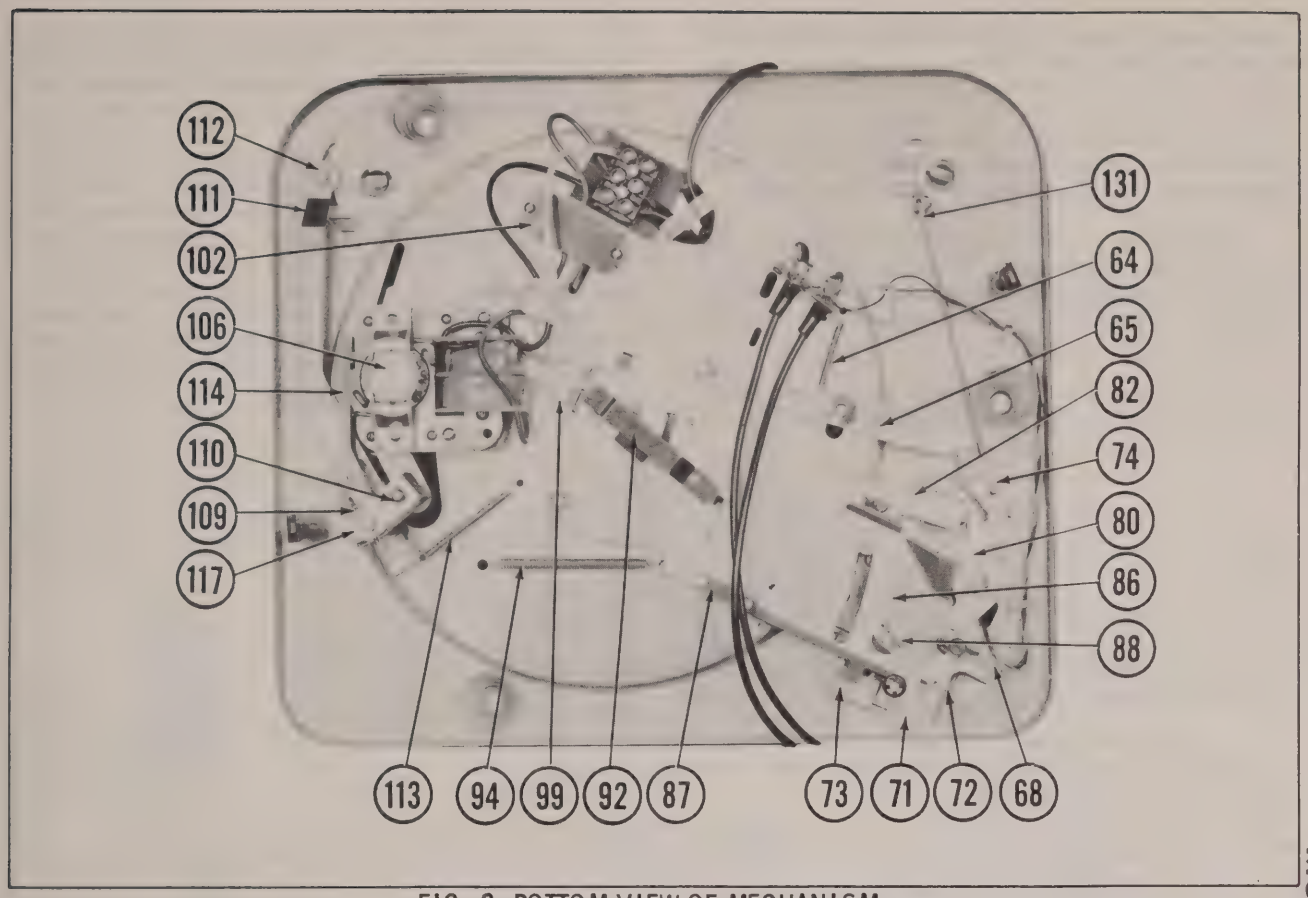


FIG. 2 BOTTOM VIEW OF MECHANISM

CHANGE CYCLE

Observe the change cycle by manually rotating the turntable. The following action can then be readily followed, and the function of each part can be more easily understood.

The automatic trip mechanism operates on the velocity trip principle. The faster inward motion of the pickup arm as it reaches the lead-out groove at the end of a record, trips the mechanism.

Pickup arm (23) and quadrant assembly (80) are connected and move together. As pickup arm (23) nears the end of a record, quadrant assembly (80) pushes actuating slide assembly (82) forward. Actuating slide assembly (82) contacts friction link (42). It, in turn, moves actuating pawl (41) toward center spindle (35).

As pickup arm (23) enters the lead-out groove, actuating pawl (41) moves rapidly toward the turntable hub. The projection on the turntable hub (Point "A" on Exploded View) seizes and turns actuating pawl (41) counterclockwise, thereby rotating cam gear (44) counterclockwise also. Cam gear (44) meshes with the turntable hub and rotates with the hub.

Cam gear (44) is connected to operating plate (86) by a shaft with a roller extending up from operating plate (86). This shaft runs in the eccentric groove in the bottom of cam gear (44). The eccentric groove in cam gear (44) controls all vertical and horizontal movements of pickup arm (23). Pickup arm (23) is lifted from the record by cam gear (44), which rotates and drives operating plate (86) forward. As operating plate (86) moves forward, pickup raising spindle (77) is forced up the incline on operating plate (86). The spindle contacts pickup height adjusting plate (18), forcing pickup arm (23) up and clear of the record.

About the same time pickup arm (23) reaches its maximum height, toggle assembly (83) — on top of operating plate (86) — contacts quadrant assembly (80), forcing pickup arm (23) back toward the rest post.

As pickup arm (23) reaches the rest post, center spindle (35) is actuated by operating plate (86). The record feed lever is pushed toward the motor, dropping a record on the turntable. As the record drops, it strikes selector arm (127), forcing it downward. (The amount of downward movement depends on the size of the record being played: a 10-inch record moves selector arm (127) down only half way; a 12-inch record forces the arm down all the way; a 7-inch record does not touch the arm at all.) Quadrant assembly (80) has three notches — a 12-, 10-, and 7-inch notch. The selector arm (127) positions selector lever (126), so that the proper notch is obtained for the record being played.

Cam gear (44) now reaches a point in the eccentric groove at which operating plate (86) moves toward the rear of the unit. This action moves quadrant assembly (80) toward the rear of the unit. Pickup arm (23) moves out and over the record lead-in groove. The arm is stopped by the proper notch on quadrant assembly (80). As operating plate (86) moves back,

pickup raising spindle (77) rides back down the incline on operating plate (86). This action permits pickup arm (23) to set down in the lead-in groove of the record.

After the mechanism has been tripped, it again follows the preceding sequence of cycling and playing, until the last record of the stack has been played.

At this time, control arm (5) drops below the shelf on center spindle (35). The control-arm assembly shaft is notched. When control arm (5) is seated, control lever spring (72) pulls control lever (71) against the notch.

As pickup arm (23) returns to the rest post, quadrant assembly (80) moves forward past control lever (71). Control lever spring (72) pulls control lever (71) forward and thereby blocks the path of quadrant assembly (80). Pickup arm (23) is stopped directly over the rest post, and rests on the post.

Since control arm assembly (5) is seated, both control lever (71) and cutoff lever (73) have moved to the right. As operating plate (86) moves toward the rear of the unit, cutoff spring (87) contacts cutoff lever (73). Because cutoff lever (73) and switch plate (74) are connected, they move toward the rear of the unit. Transfer lever (65) and switch lever (97) are both actuated by switch plate (74). Switch lever (97) shuts off switch box assembly (102), and also retracts jockey pulley (48) from the motor pulley.

ADJUSTMENTS

Needle Pressure Adjustment

Needle pressure depends upon the cartridge. It is measured on the level of the first record at the needle. The pressure must be not less than 6 nor more than 10 grams.

To adjust the needle pressure, reposition pickup balancing spring (21) in the various holes until the correct pressure is obtained.

Pickup Arm Height

The point of the needle should clear the top record by 1/8 inch when a stack of 10 records is on the turntable. In addition, the pickup arm should clear the underside of a record on the center spindle, as well as the top of the rest post.

To raise pickup arm (23), turn screw (20B) clockwise; to lower the arm, turn the screw counterclockwise.

Needle Setdown Adjustment

The setdown position of the needle on the record is adjusted by means of screw (15). Turn this screw until the needle sets down 1/8 inch from the edge of a 10-inch record. (It is advisable to make this adjustment with a stack of 10 inch records on the turntable.) When the 10-inch setdown is correct, the 12— and 7-inch setdown will also be correct.

Speed Change Adjustment

1. Remove turntable.
2. Turn the Speed Change lever to 33.
3. Through the screw-driver slot in jockey arm pivot (110), adjust jockey pulley (48) until it is just below the first shoulder of motor spindle (106A). Turn jockey arm pivot (110) clockwise to lower jockey pulley (48) and counterclockwise to raise it.

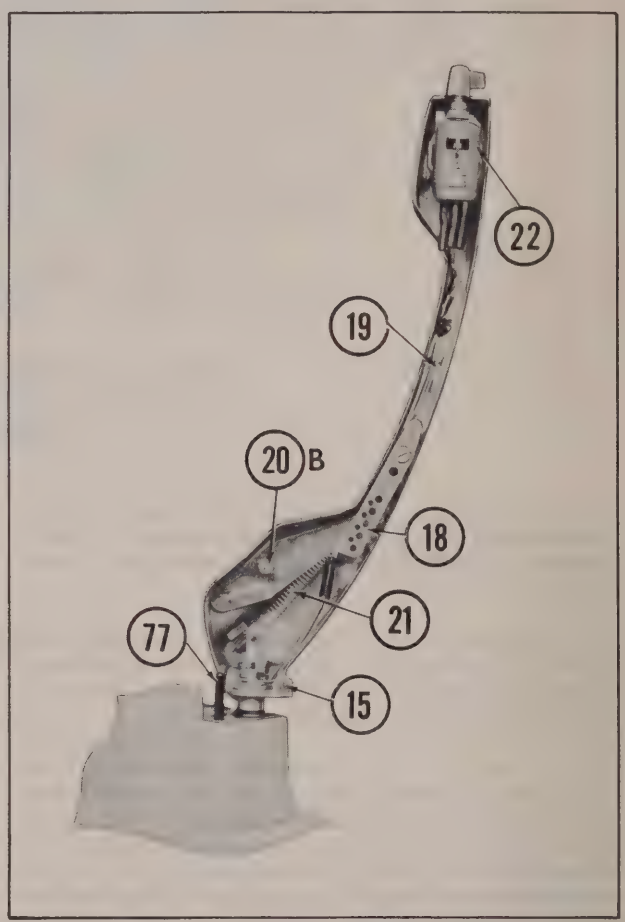


FIG. 3 UNDERSIDE OF TONE ARM

LUBRICATION

Under normal operation the original lubrication should last for a long time. However, if the changer is operated continuously for long periods of time, so that the mechanism becomes noisy or the levers and sliding members respond sluggishly, lubricate as follows:

With medium grease:

1. Raising shoe (114).
2. Jockey arm pivot (110).

3. Surfaces of operating plate (86).

4. Teeth of cam gear (44).

With medium oil:

1. Pivots of pickup hinge (14).

2. Bearing of pickup raising spindle (77).

3. Bearing of turntable (4).

With light oil:

1. Spindle of jockey pulley (48). (Do not get oil on the tire of jockey pulley (48), or on the turntable rim.)

TROUBLE CHART

Symptom	Cause	Remedy
Pickup arm (23) does not track correctly across record.	1. Tip of needle clogged with dust.	1. Clean the needle.
	2. Tip of needle broken or worn.	2. Replace needle if tip is broken or worn.
	3. Pickup leads too tight.	3. Give pickup leads enough slack that pickup can move freely across record.
	4. Changer not level.	4. Level changer with a level.
	5. Binding or friction in pickup raising spindle (77).	5. Make sure all moving parts and bearing surfaces are free and are lightly oiled.
	6. Insufficient needle pressure.	6. See "Needle Pressure" under "Adjustment".
	7. Actuating slide (82) sticking.	7. This lever must be free to slide on its bearing surfaces. Check for bends, rust, or other foreign matter.
	8. Worn record, or record has damaged groove.	8. Do not use record.
Record does not drop when changer cycles.	1. Deformed record feed lever, part of center spindle (35).	1. Replace record feed lever.
After playing last record, pickup arm returns to 7-inch position, and changer shuts off.	1. Control lever (71) sticking.	1. Free control lever (71) by moving it backward and forward several times.
	2. Control lever spring (72) stretched or loose.	2. Replace spring (72).
Record drops, pickup arm moves on to record, and changer shuts off.	1. Control lever (71) and cut-off lever (73) overlapping.	1. See that levers are flat and contact edge-to-edge only.
	1. Hole in record too large.	1. Do not use record.
	2. Record keeper on center spindle (35) not fully down.	2. Carefully clean and remove burrs. Do not oil; it should fall under its own weight.
	3. Control arm (5) not holding records level.	3. Gently twist control arm (5) until it will hold record stack parallel to top of turntable.
Pickup arm does not setdown properly on records.	1. Pickup arm not adjusted correctly.	1. See "Needle Setdown" under Adjustments.

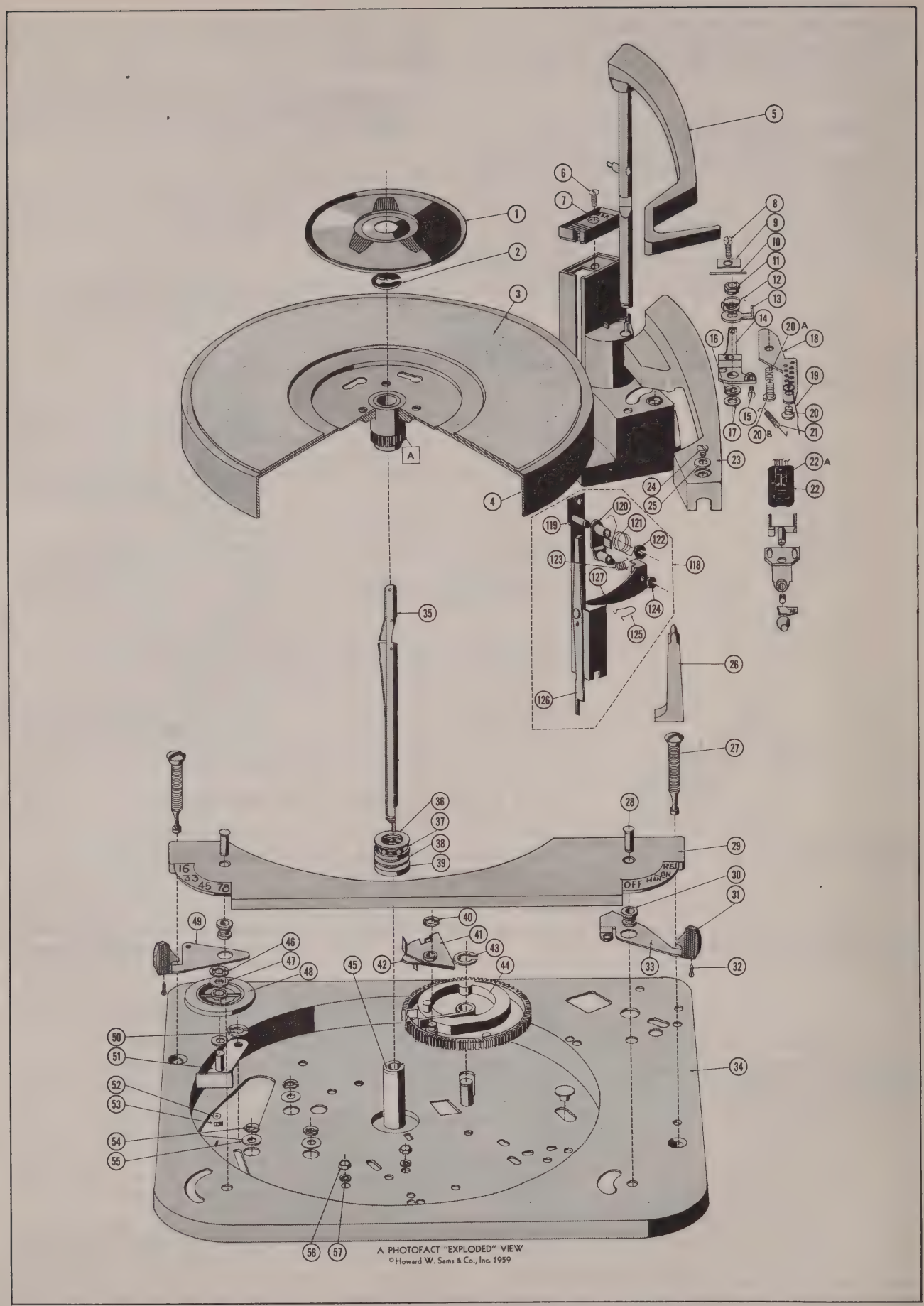


FIG. 4A EXPLODED VIEW OF PARTS ABOVE BASEPLATE

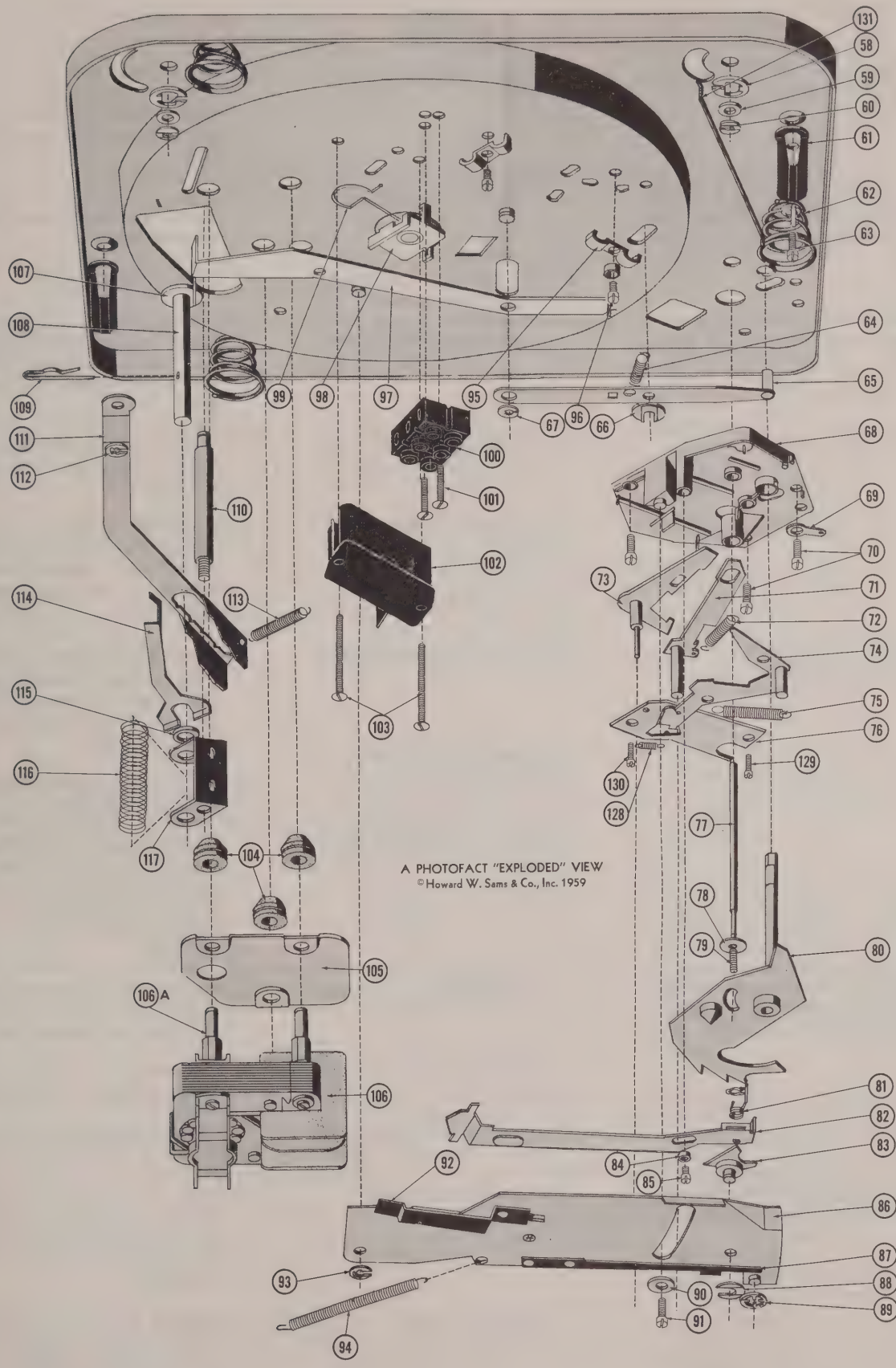


FIG. 4B EXPLODED VIEW OF PARTS BELOW BASEPLATE

TROUBLE CHART (CON'T.)

Symptom	Cause	Remedy
Pickup arm does not move in when set down on record.	1. No run in groove on record.	1. Make sure the record is the standard type with a run in groove from the outside edge of the record to the recorded section.
Pickup arm fails to move in to play last record, but returns to rest post (26), and unit switches off.	1. Control lever(71) sticking.	1. Free control lever (71) by moving it backward and forward several times.
	2. Control lever spring (72) stretched or loose.	2. Replace spring (72).
Turntable stops in middle of change cycle.	1. Jockey pulley(48)slipping.	1. Clean inside rim of turntable and the rubber tire of the jockey pulley (48) to remove any oil and dirt.
Turntable speed too slow.	1. Binding in motor bearing.	1. Tap side of motor lamination lightly, to free self-aligning bearings.
	2. Binding in turntable bearing.	2. If turntable bearing does not turn easily when jockey pulley (48) is disengaged, remove turntable and clean; then lubricate with light oil.
	3. Jockey pulley(48)slipping.	3. Make sure jockey arm pivot (110) is free in raising bracket (117), end of jockey arm (51) not jammed on unit plate, spring (116) not loose.
	4. Line voltage too low.	4. The line voltage should not be less than 100 volts.
	5. Operating temperature too low.	5. If the changer has been standing in a cold place or is to be operated in surroundings at a temperature of less than 45° F., the turntable speed will be slow initially.
Turntable revolves when On-Off-Reject lever is operated, but pickup arm remains on its rest post.	1. On-Off-Reject lever not operated correctly.	1. Be sure On-Off-Reject lever is fully to the right, except when operating the changer manually.
	2. Pickup arm clipped to rest post.	2. Lift pickup arm clear, and replace lightly on top of rest post.
	3. Actuating slide(82)trapped under friction link (42).	3. Revolve cam gear (44) by hand to free On-Off-Reject lever.
Turntable does not rotate when On-Off-Reject lever is moved to On.	1. No current to motor.	1. Make sure current is reaching external AC leads, and switch is functioning properly. Check all wiring and contacts to and from switch.
	2. Defective motor.	2. Remove turntable and operate motor without a load. If motor spindle is not rotating and AC supply is reaching the motor, the motor is faulty and should be repaired or replaced.

Symptom	Cause	Remedy
	3. Jockey pulley (48) not driving.	3. Carefully clean the inside rim of the turntable and the rubber tire of jockey pulley (48) to remove any oil or dirt.
	4. Jockey pulley (48) not engaging turntable rim.	4. Make sure spring (116) is connected properly, and jockey arm (48) is free to pivot.
Pickup arm does not locate on rest post.	1. Toggle (83) loading too tight.	1. Replace circlip (88).
Changer fails to switch off after pickup has played last record and returned to rest post.	1. AC leads foul switch slide.	1. Move AC leads clear of slide.
	2. Faulty switch.	2. Disconnect from AC. Remove cover and check operation of contacts. Replace switch if necessary.
	3. Tight cutoff lever (73).	3. Free lever by moving it backward and forward several times.
	4. Cutoff lever spring (87) weak or loose.	4. Replace spring (87).
Changer continues to cycle; pickup arm drops onto record every cycle.	1. Operating plate spring (94) weak or loose.	1. Replace spring (94).
Changer does not shut off after the last record has been played.	1. Control arm (5) not dropping.	1. Make sure control arm (5) is in the operating position and drops freely. If necessary, oil spindle.
	2. Control lever (71) and cutoff lever (73) overlapping.	2. Make sure levers are flat and contact edge-to-edge only.
Pickup arm remains on record run-out groove.	1. No finishing run-out groove on record.	1. Check record for eccentric run-out groove.
	2. Needle jumps out of groove in record.	2. Make sure needle pressure is correct, and record is not defective. Check for damage or dust on needle. Replace or clean needle if necessary. Make sure all moving parts and bearing surfaces of pickup spindle assembly are free and lightly oiled.
	3. Faulty actuating pawl (41) and friction link (42).	3. When friction link (42) has been moved toward center of cam gear (44) and then slowly pushed outwards, it should also carry actuating pawl (41) outward as it starts moving. If the pawl does not move freely with the link, it will not engage the turntable projection (A) to start the cycle. If the assembly sticks, remove it, and clean and lightly oil bushing of actuating pawl (41).
Noise while record plays.	1. Low-pitched rumble from loudspeaker.	1. Make sure motor is freely suspended on motor rubber mounting. The motor leads should have enough slack that the motor can float.

TROUBLE CHART (CON'T.)

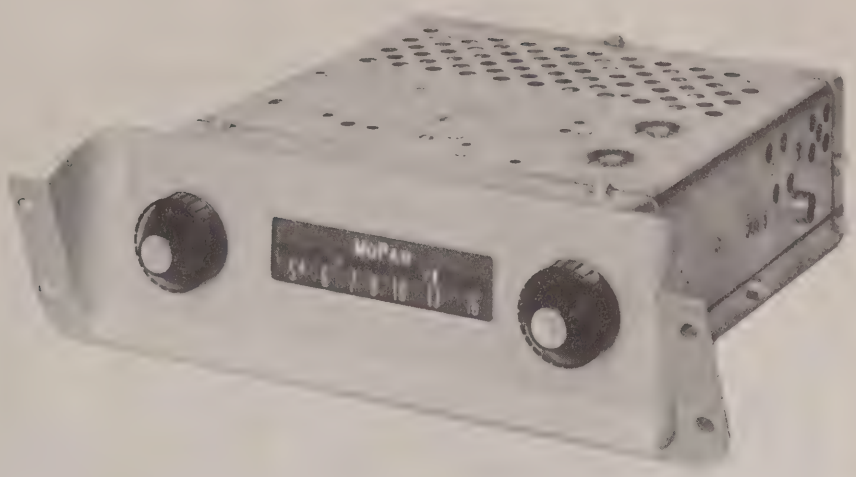
Symptom	Cause	Remedy
	2. Defective turntable bearings.	2. Check for foreign matter in the bearings or on thrust washer (36), or defective balls or binding between balls and ball cage. Grease ball race (37). Lubricate center spindle (35) with light oil.
	3. Defective jockey pulley (48).	3. A rapid thumping sound while the motor is running may indicate uneven wear of jockey pulley (48). If the surface of the rubber tire is rough, replace the jockey pulley.
	4. Defective records.	4. Worn or defective records cause rumble, scratch, and distorted sound. A warped record may slip on the other records, causing wow. An enlarged hole can also cause wow.
	5. Squeaks.	5. Squeaks indicate a lack of oil. Lubricate.
Pickup arm strikes underside of record on spindle when it rises, or needle catches on top of last record when pickup arm moves in.	1. Pickup arm height incorrect.	1. See "Pickup Arm Height" under "Adjustments".
	2. Control arm (5) not holding records level.	2. Gently twist control arm (5) until it will hold record stack parallel to top of turntable.
Distorted sound.	1. Defective record.	1. Do not use record.
	2. Defective amplifier.	2. Check amplifier and speaker.
	3. Faulty cartridge.	3. Replace cartridge.
	4. Dirty needle.	4. Clean needle.
No sound	1. Defective cartridge.	1. Replace cartridge.
	2. Defective wiring.	2. Check for shorts or open circuit in pickup leads.
	3. Defective amplifier.	3. Check amplifier and speaker.

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1	A102167	Turntable Center Dish Assembly
2	A100779	Circlip
3	D102018	Turntable Mat
4	C102164	Turntable Assembly
5	B102155	Control Arm Assembly
6		Screw Type 25 4-24 x 5/16" Hd.
7	B102050	Selector Cover
8		Screw 4 B. A. x 1/4" Ch. Hd.
9	A102276	Clamping Plate
10	A102078	Pivot Pin
11	A102089	P. U. Spindle Nut
12	A102115	Spring (Pickup Overload Plate)
13	A102041	Pickup Overload Plate
14	B102045	Pickup Hinge
15		Screw 6 B. A. x 3/8" Ch. Hd. (Needle Setdown)
16	A102109	Circlip
17	A102104	Washer
18	B102062	Pickup Height Adjusting Plate
19	A102268	Pickup Securing Spring
20		Screw Type 25 4-24 x 1/4" B. Hd
20A	A100807	Spring

Ref. No.	Part No.	Description
20B		Screw 6 B.A. x 3/8" Ch. Hd. (Pickup Height)
21	A102124	Spring (Pickup Balancing)
22	T. C. 8M	Cartridge
	T. C. 8H	Cartridge
	T. C. 8S	Cartridge (Stereo)
22A	T. C. 8R	Needle (78 RPM)
	T. C. 8G	Needle (L.P.)
	T. C. 8RS	Needle (Stereo)
23	D102033	Pickup Arm
24		Screw 6 B.A. x 3/16" Hd.
25	A102030	Screw Escutcheon
26	B102036	Pickup Rest
27	A101603	Transit Screw
28	A102069	Escutcheon Pin (2)
29	C102064	Escutcheon
30	A102080	Knob Spindle (2)
31	B102065	Knob (2)
32		Screw Type 25 4-24 x 1/4" B.H. (2)
33	A102146	Reject Lever Assembly
34	D102169	Mainplate Riveting Assembly
35	A102156	Center Spindle Assembly
36	A101506	Thrust Washer
37	A101649	Ball Race And Thrust Washers
38	A101506	Thrust Washer
39	A102058	Damping Washer
40	A100762	Circlip
41	A102043	Actuating Pawl
42	A102044	Friction Link
43	A102110	Circlip
44	A102134	Cam Gear Final Assembly
45	A102055	Turntable Bearing
46	A100762	Circlip
47	A101620	Jockey Pulley Spindle Washer (2)
48	A101623	Jockey Pulley Assembly
49	A102145	Speed Change Lever Assembly
50		Circlip
51	A102185	Jockey Arm
52		Lockwasher 6 B. A.
53		Half Nut 6 B. A.
54	A100762	Circlip (3)
55	A101646	Washer (3)
56		Full Nut 6 B. A. (2)
57		Lockwasher 6 B.A. (2)
58	A102131	Circlip
59	A102101	Washer
60	A102128	Washer
61	A102166	Retaining Clip (2)
62	A101679	Spring (Unit Mounting 3)
63		Screw Type 25 8-18 x 1/2" B. Hd.
64	A102129	Spring (Transfer Lever)
65	A102140	Transfer Lever Assembly
66	A102108	Circlip
67	A102109	Circlip
68	B102154	Support Casting Assembly
69	A102352	Tag
70		Screw Type 25 6-20 x 3/8" B. Hd. (3)
71	A102136	Control Lever Assembly
72	A102119	Spring (Control Lever)

Ref. No.	Part No.	Description
73	A102137	Cutoff Lever Assembly
74	A102142	Switch Plate Assembly
75	A102120	Spring (Switch Plate)
76	B102008	Retaining Plate
77	A102097	Pickup Raising Spindle
78	A102103	Washer (Pickup Raising Spindle)
79	A102118	Spring (Pickup Raising Spindle)
80	B102151	Quadrant Assembly
81	A102116	Spring (Acuating Slide)
82	A102141	Actuating Slide Assembly
83	A102139	Toggle Assembly
84	A102083	Actuating Slide Spacer
85		Screw Type 25 4-32 x 3/16" B. Hd.
86	B102153	Operating Plate Final Assembly
87	A102029	Spring (Cut-off)
88	A102108	Circlip
89	A102251	Retaining Clip
90	A102237	Washer
91		Screw Type 25 4-24 x 1/4" B. Hd.
92	A102012	Feed Lever Raising Spring
93	A100762	Circlip
94	A102123	Spring (Operating Plate)
95	A101465	Cable Clamp
96		Screw Type 25 6-20 x 1/4 B. Hd.
97	B102028	Switch Lever
98	A102017	Support Plate (Part of Mainplate)
99	A102111	Retaining Clip
100		AC Connector
101		AC Connector Screws
102	B102157	Switch Box Assembly
103		Screw 6 B. A. x 15/16" R. Hd. (2)
104	A102181	Rubber Mounting (3)
105	A102307	Motor Shield
106	B102159	T. P. 8/6 Motor Assembly
107	A102013	Washer (Part of Mainplate)
108	A102002	Raising Pillar (Part of Mainplate)
109	A101460	Clip
110	A102004	Jockey Arm Pivot
111	B102005	Speed Change Slide
112		Circlip
113	A102122	Spring (Speed Change Slide)
114	A102006	Raising Shoe
115	A102003	Raising Shoe Spacer
116	A102117	Spring (Raising Pillar)
117	A102000	Raising Bracket
118	B102149	Selector Unit Assembly
119	B102010	Selector Column
120	B102009	Trip Arm
121	A102114	Spring (Trip Arm)
122	A100762	Circlip
123	A102113	Spring (Selector Arm)
124	A100785	Circlip
125	A102112	Spring (Selector Lever)
126	B102014	Selector Lever
127	B102011	Selector Arm
128	A102121	Spring (Cut-off Lever)
129		Screw Type 25 4-24 x 3/16" B. Hd. (2)
130		Screw Type 25 6-20 x 1/2" B. Hd.
131	A102127	Reject Link



TRADE NAME	Mopar Model 701 (For 1959 Simca Automobiles)
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated 3 Tube Custom Built Automobile AM Receiver with Transistorized Output
POWER SUPPLY	12 Volt Storage Battery — RATING 1.9 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540-1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:
- A1 thru A4 .... GENERAL CEMENT #8606, 8606L, 8282, 9295; WALSCO #2526, 2543, 2544, 2545
- A5 thru A7 .... GENERAL CEMENT #5000, 5003, 5014, 5015, 5016, 8276, 8290; WALSCO #2512, 2515, 2522, 2523, 2525, 2537
- A8 thru A10 ... GENERAL CEMENT #9050L, 9150; WALSCO #2521

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side thru .1mfd to antenna receptacle. Low side to chassis.	262.5KC (400~ Mod)	High freq. end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to antenna receptacle.	1610KC	"	"	A5, A6, A7	"
	Step 3 is not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9, A10) out of coils but not out of coil forms. Repeat step 2.						
3.	Fig. 1	Thru dummy to antenna receptacle.	1200KC	Tuner carriage 9/32" from high freq. end stop.	Across voice coil	A8, A9, A10	Adjust for maximum output. Repeat steps 2 and 3. Cement cores.
4.	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output						

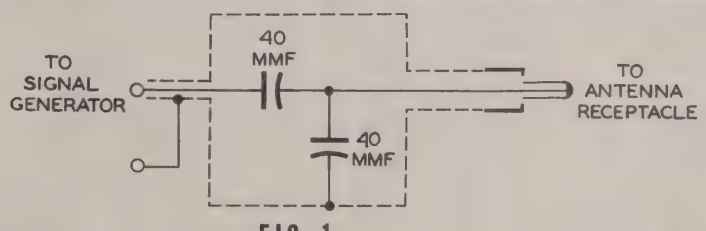


FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JD395

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆	GENERAL ELECTRIC ◆	RAYTHEON ◆	SYLVANIA ◆

ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Converter	12AD6	V3	Det.-AVC-AF Amp.	12AE6A
V2	IF Amplifier	12BL6			

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N573	Driver			2N573	2N573	PNP
X2	MN-29①	Output	2N155	2N176		2N176	PNP

① Alternate Type 2N176. When replacing transistor, apply DC-4 grease (Part #11M490487) or equivalent to both sides of insulator. Tighten mounting screws securely.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1A	▲500	16	23K562581	AFH3-00-95		WP200.6		TVLS-2157 *	
B	■500	16							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	22 N750		N750-DI 22	DTN-22	C10Q22U	CCTN-220	CN7-422	10TCU-Q22
C3	40-430	#20K542456						
C4	.003 200V		P288N-003	D6-302	CUB6D3	6DP-1-302	GEM-623	5BF-D33
C5	10 N750 5%		N750-DI 10	DTN-10	C10Q10U	CCTN-100	CN7-410	10TCU-Q10
C6	20-120	#20K541014				302		
C7	100 N750 10%		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN75-310	10TCU-T10
C8	47 N750		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C9	395-470	#20A485708						
C10	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C11	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCC-Q27
C12	50000		BPD-05	DDA-503	H-05S5	4DP-3-503	TA-150	5HK-S50
C13	3000		BPD-003	DD-302	BYA10D3	CCD-302	B-233	5HK-D30
C14	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C15	25000 200V		BPD-03	DF-303	BYB6S3	CCD-303	GEM-4125	2WF-S27
C16	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

\# Motorola Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2meg	½	18K562422					Volume
B	Switch							Power Off-On
R2	210Ω	1(WW)	18K543400		39-200 *	112-200 *	FL-200 *	Bias * Use 33Ω series res.
	33Ω stop							

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

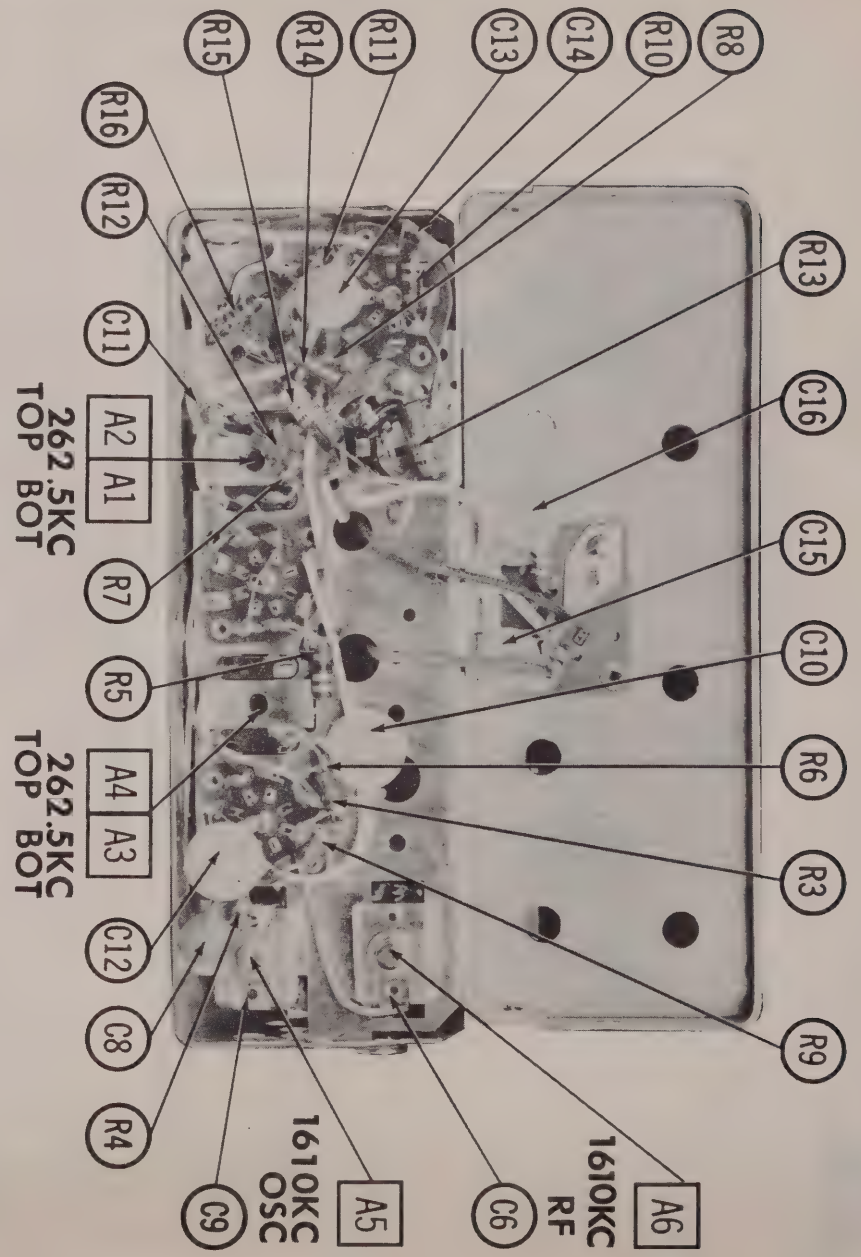
ITEM No.	RATING	REMARKS
R3	47meg	
R4	33K	
R5	10meg	
R6	15meg	
R7	47K	

ITEM No.	RATING	REMARKS
R8	1.5meg	
R9	220K	
R10	10meg	
R11	4700Ω	
R12	270Ω	

ITEM No.	RATING	REMARKS
R13	5.6Ω 1W	
R14	10Ω COLD	# 6K540634
R15	.47Ω	
R16	470Ω	

\# Motorola Part Number.

CHASSIS BOTTOM VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Tuning Coil	24K562246 †						† Part of M2.
L2	RF Tuning Coil	24K562245 †						
L3	Osc. Tuning Coil	24K562244 †						
L4	Input IF	24B543286	16-6752	16-6752	BC-350	12-H1	RF-3	
L5	Output IF	24K562151	16-6754	16-6754	BC-354	12-H6		

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L6	1.9A	.6Ω	.001 Hy.	25K542487						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	20	1	25K543341						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA							NOTES
	PRI.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	22Ω, 3-4Ω tap	25C543443							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	50C543476	5A15	① Alternate Part Number.
	5"	PM	3-4Ω	50C562767①		

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	7½A 32V	6R122346	9K562721	30707.5 (SFE 7½A32V)	155009	SFE 7½	HDH

MISCELLANEOUS

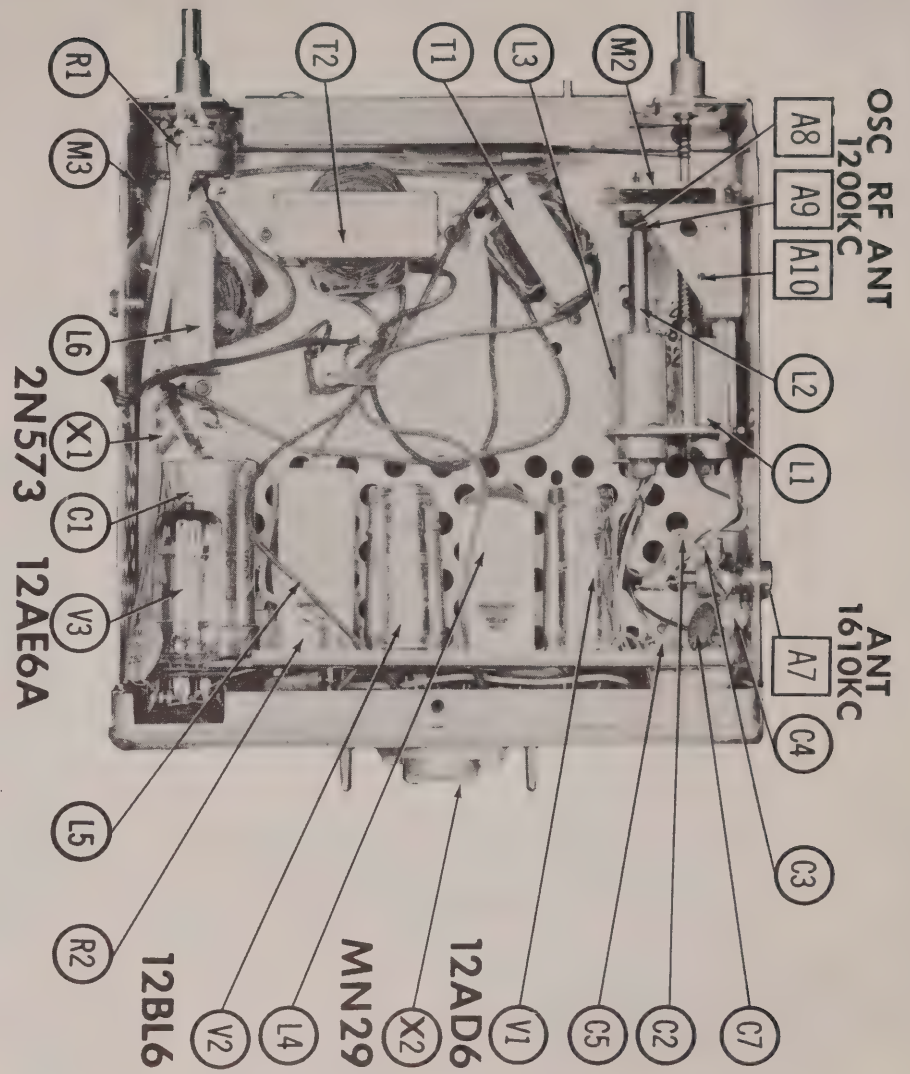
ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Tuner	77K662547	Complete (MT-283)
M3	Spark Plate	64K530177	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

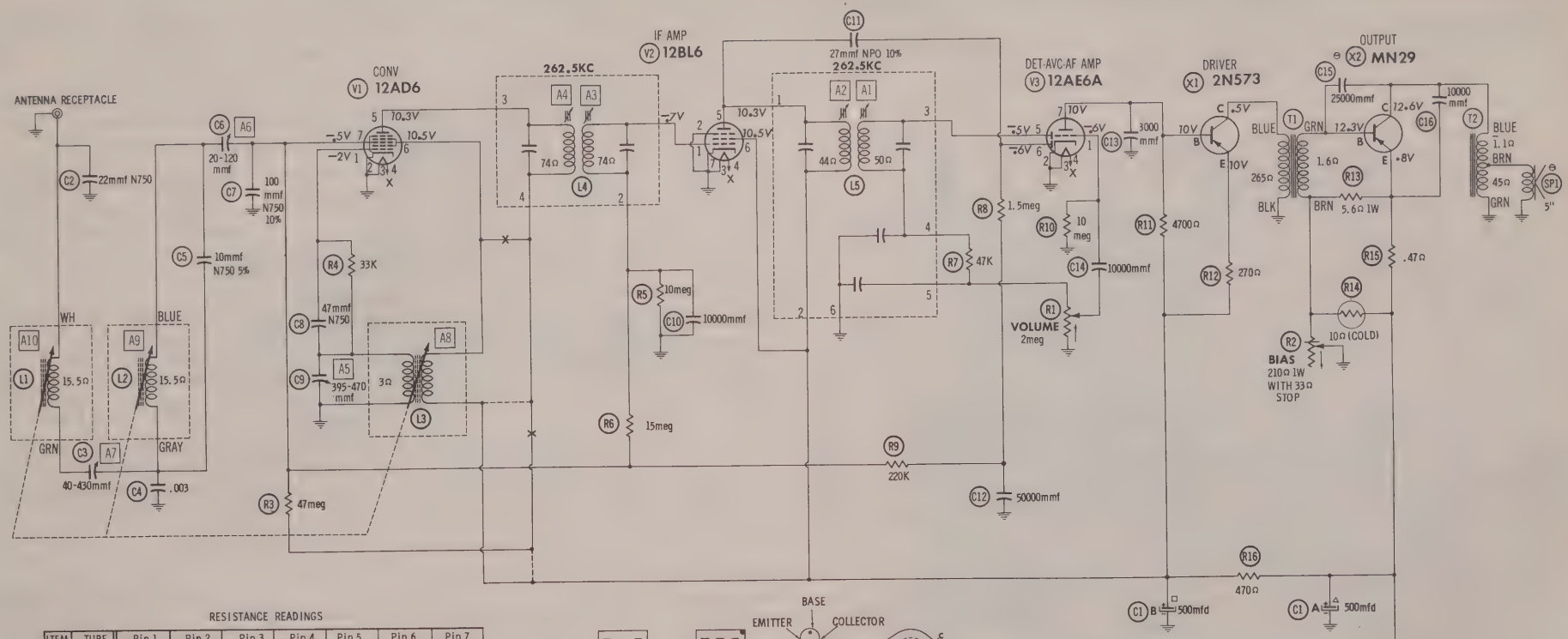
NAME	PART NO.	DESCRIPTION
Knob	36B534305	Tuning, Volume
Pointer	1K543277	
Dial Scale	34B562683	
Dial Escutcheon	13D562493	

CHASSIS—TOP VIEW



WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No. 8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire	Use BELDEN No. 8885
Bonding Strap	Use BELDEN No. 8661



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12AD6	33K	0Ω	0Ω	2.6Ω	†545Ω	†470Ω	20meg
V2	12BL6	10meg	0Ω	0Ω	2.6Ω	†515Ω	†470Ω	0Ω
V3	12AE6A	10meg	0Ω	0Ω	2.6Ω	2meg	20meg	¶

¶ TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

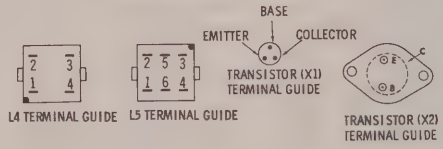
† MEASURED FROM JUNCTION OF R16 AND C1A.

1. DC voltage measurements taken with vacuum tube voltmeter;
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes posssible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

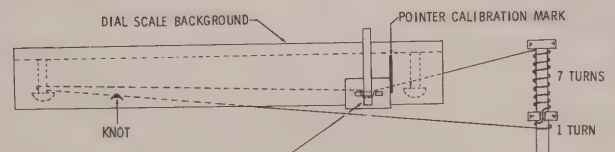
⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

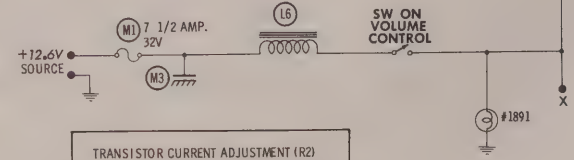
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.


DIAL SCALE BACKGROUND
POINTER CALIBRATION MARK
7 TURNS
1 TURN
KNOT
MANUAL TUNING SHAFT
POINTER - WITH TUNER SET TO 1610 Kc SET POINTER TO MARK AND CEMENT TO DIAL SPRING.
SET TUNER SO CORES ARE OUT OF COILS (1610 Kc).

DIAL CORD STRINGING



TRANSISTOR CURRENT ADJUSTMENT (R2)

Connect a 0-1 Amp. DC ammeter (.05Ω max. internal resistance) in parallel with the output transformer. Apply 12.6VDC to the receiver and adjust R2 for 380MA.
If an input voltage of 13.2VDC is used, adjust R2 for 440MA.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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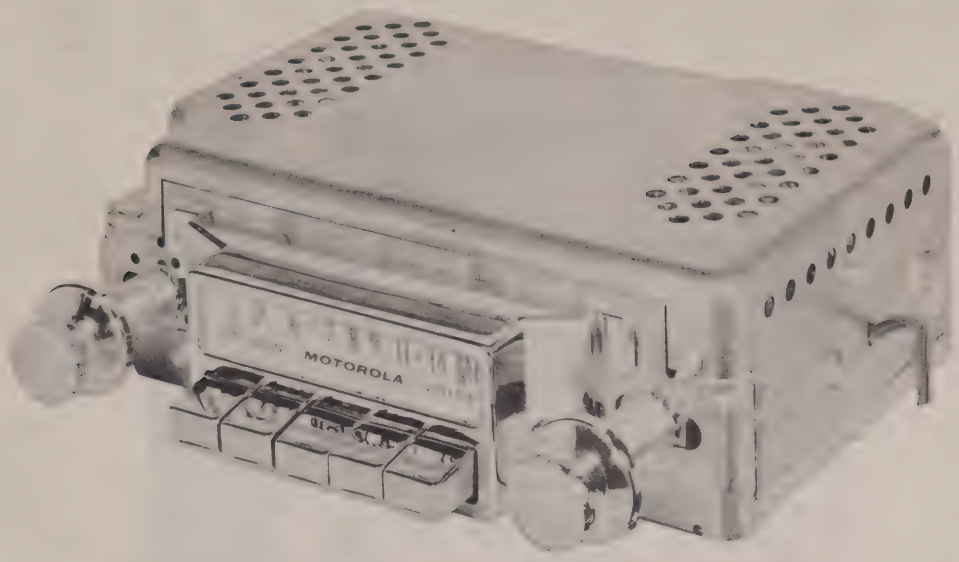
MOPAR MODEL 701

PHOTOFACT* Folder



MOTOROLA
MODEL GV-701

TRADE NAME	Motorola Model GV-701
MANUFACTURER	Motorola Inc., 4545 W. Augusta Blvd., Chicago 51, Illinois
TYPE SET	Battery Operated Universal Type 5 Tube AM Automobile Receiver with Transistorized Output
POWER SUPPLY	12 Volt Storage Battery — RATING 1.5 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540-1610KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Use .5mfd 100V capacitor in series with low side of signal generator.
Suggested Alignment Tools:
A1 thru A4 ..... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545
A5, A6 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A8, A9, A10 .... GENERAL CEMENT #9050L, 9150
WALSCO #2521

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of Converter. Low side to chassis.	262.5KC (400∿Mod)	High Freq. end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	Fig. 1	Thru dummy to antenna receptacle.	1610KC	"	"	A5, A6, A7	"
	Step 3 is not necessary unless tuner has been tampered with or associated components have been replaced. If necessary, back tuning cores (A8, A9 and A10) 7/16" out of the coils. Repeat step 2.						
3.	Fig. 1	Thru dummy to antenna receptacle.	1200K	Tuner carriage 9/32" from high end stop.	Across voice coil	A8, A9, A10	Adjust for maximum output. Repeat steps 2 and 3.
	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum output.						

PUSHBUTTON ADJUSTMENT

1. Pull pushbutton out.
2. Tune manually to desired station.
3. Press pushbutton in firmly.
4. Repeat for remaining pushbuttons.

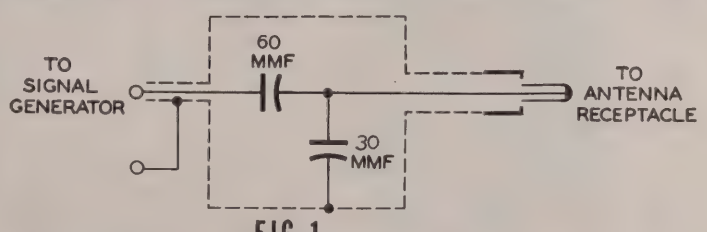


FIG. 1

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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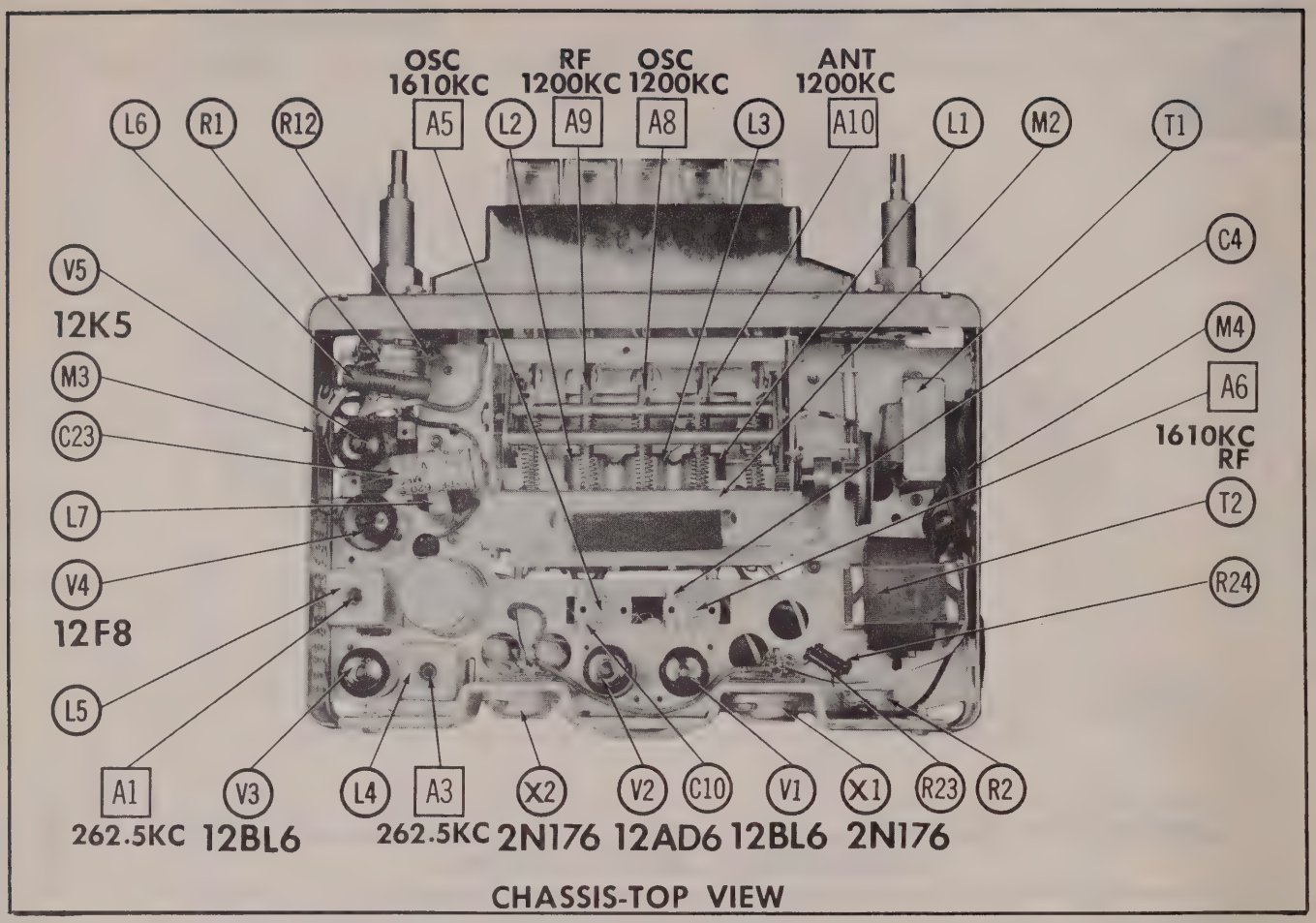
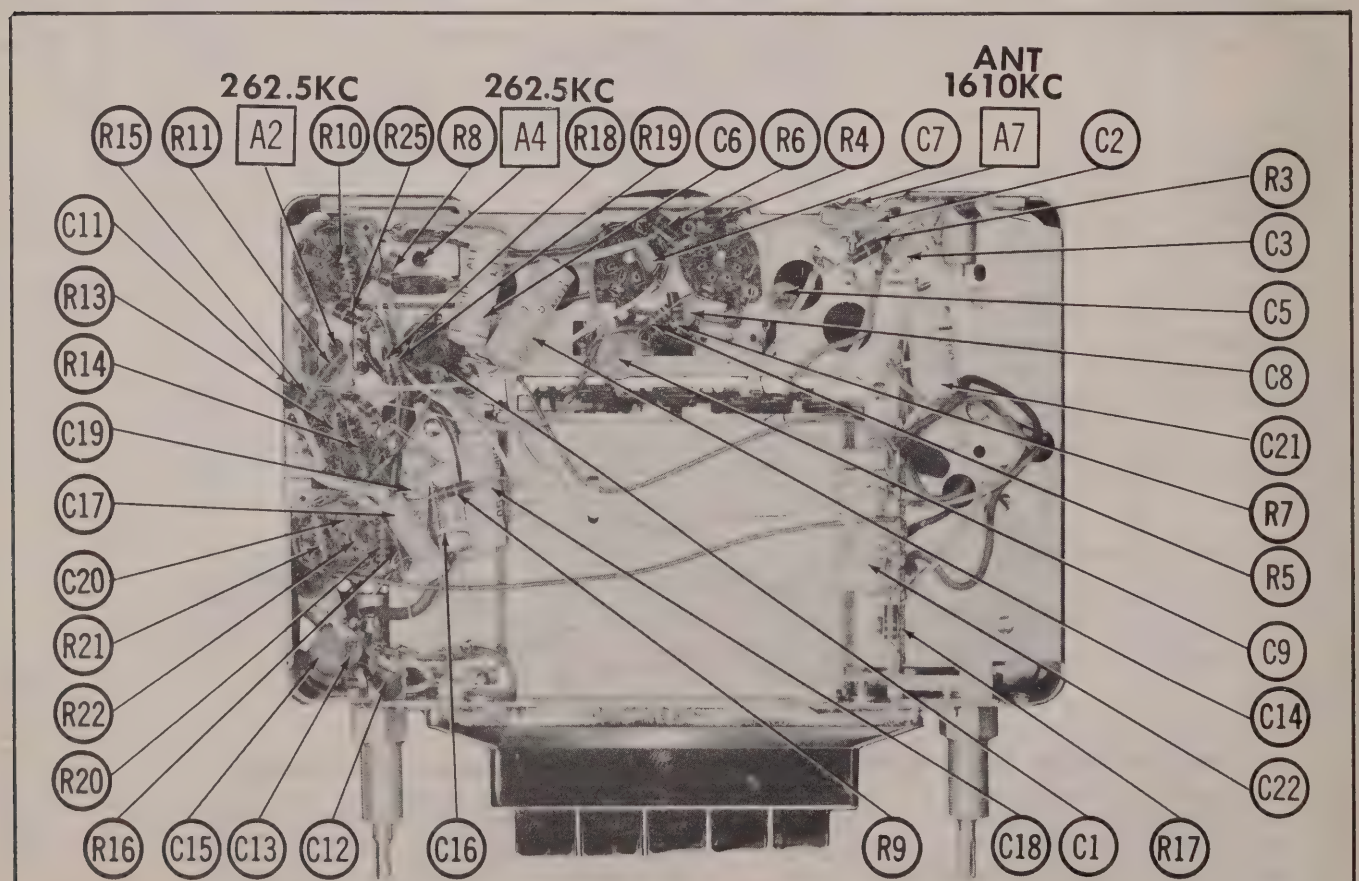
JD359

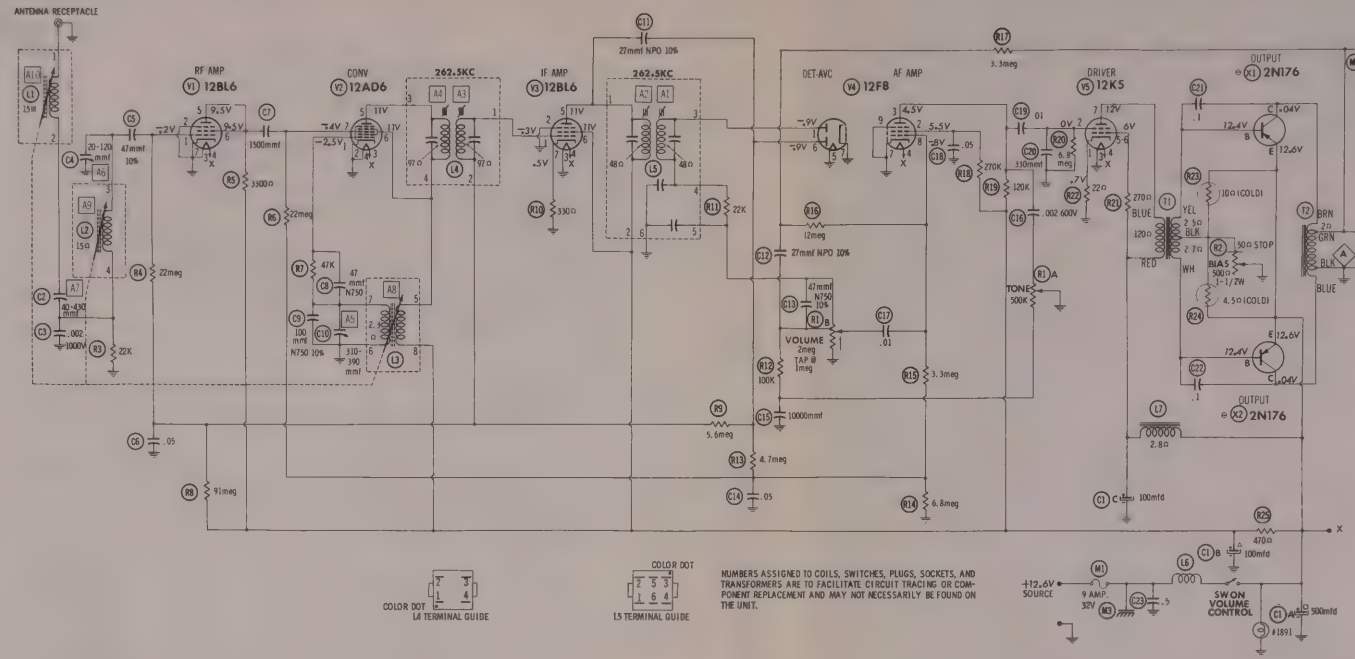
SET 465 FOLDER 8



CHASSIS-TOP VIEW



CHASSIS-BOTTOM VIEW



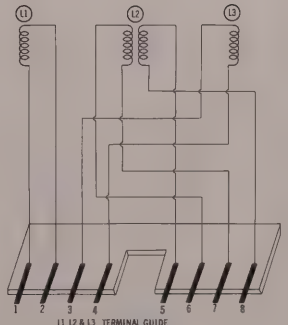
NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BL6	35meg	0Ω	0Ω	1.5Ω	†380Ω	†380Ω	0Ω		
V2	12AD6	47K	0Ω	1.5Ω	0Ω	†570Ω	†470Ω	27meg		
V3	12BL6	14meg	0Ω	0Ω	1.5	†520Ω	†470Ω	330Ω		
V4	12F8	2meg	†270K	†120K	1.5Ω	0Ω	10meg	0Ω	6meg	0Ω
V5	12K5	22Ω	6.8meg	0Ω	1.5Ω	†270Ω	†270Ω	†120Ω		

TRANSISTOR CIRCUIT RESISTANCE NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

† MEASURED FROM JUNCTION OF C1A AND R25.



L1 L2 & L3 TERMINAL GUIDE

TRANSISTORS (X1 & X2) TERMINAL GUIDE

TRANSISTOR CURRENT ADJUSTMENT

The receiver must be cold and adjustment made within one minute after turning set on. Applied voltage must be 12.6 volts during adjustment.

Disconnect ground lead at point Ⓐ leaving speaker connected to output transformer. Connect positive lead of a 0-1A DC ammeter (Max. internal resistance .05Ω) to point Ⓐ. Negative to chassis.

Turn Volume control fully counterclockwise. Set R2 for maximum resistance. Turn the set on and adjust R2 for a reading of 160MA within one minute. Remove the meter and resolder ground lead to point Ⓐ.

If 14VDC source is used, adjust R2 for 200MA.

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Battery voltage maintained at 12.6 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

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MOTOROLA
MODEL GV-701

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	RF Amplifier	12BL6	V4	Det.-AVC-AF Amp.	12F8
V2	Converter	12AD6	V5	Driver	12K5
V3	IF Amplifier	12BL6			

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N176	Output	2N155	2N176		2N176	PNP Note 1
X2	2N176	Output	2N155	2N176		2N176	PNP Note 1

Note 1. When replacing, apply DC-4 grease (Part #11M490487) or equivalent to each side of insulator. Tighten mounting screws securely.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	■500	16	23B560487			WP300.8	TMD-109 TD-100-25	TVLS-3026*	
B	▲100	16							
C	100	16							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	40-430	#20A543178						
C3	.002 1000V		P1088N-002	DD-202	CUB10D2	16DP-1-202	GEM-1022	10TM-D2
C4	20-120	#20K541014				302		
C5	47 10%		DI-47	DD-470	L10Q47	CCS-470	CNO-447	10TS-Q47
C6	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C7	1500		BPD-0015	DD-152	BYA10D15	CCD-152	B-215	5HK-D15
C8	47 N750		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C9	100 N750 10%		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C10	310-390	#20K541700						

CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C11	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCU-Q27
C12	27 NPO 10%			TCZ-27	C10Q27C	CCTO-270	CNO-427	10TCU-Q27
C13	47 N750 10%		N750-DI 47	DTN-47	C10Q47U	CCTN-470	CN7-447	10TCU-Q47
C14	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C15	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C16	.002 600V		P688N-002	DD-202	CUB6D2	6DP-1-202	GEM-622	6TM-D2
C17	.01 200V		P288N-01	DD-103	CUB2S1	4DP-1-103	GEM-411	2TM-S1
C18	.05 200V		P288N-05	DF-503	CUB2S5	4DP-3-503	GEM-415	2TM-S5
C19	.01 200V		P288N-01	DD-103	CUB2S1	4DP-1-103	GEM-411	2TM-S1
C20	330		BPD-00033	DD-331	L10T33	CCD-331	B-333	5GA-T33
C21	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C22	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C23	.5 100V		P288N-5		CUB2P5		GEM-205	2TM-P5

Motorola Part Number.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	18B542899-D	F1-41 †	RTV-639C	〉	■ UE1499S	Tone
B	2meg 1meg tap	½		R2-75	Not Req.	〉		Volume
C	Switch					〉		Off-On
R2	500Ω 50Ω Stop	1½(WW)	18B542930	KR-4	Not Req. 39-500-100	112-500 *	FL-500-S	Bias

* Use 50Ω resistor in series with terminal. † Grind or file flat on bushing as required.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	22K	
R4	22meg	
R5	3300Ω	
R6	22meg	
R7	47K	
R8	91meg	
R9	5.6meg	
R10	3300Ω	

ITEM No.	RATING	REMARKS
R11	22K	
R12	100K	
R13	4.7meg	
R14	6.8meg	
R15	3.3meg	
R16	12meg	
R17	3.3meg	
R18	270K	

ITEM No.	RATING	REMARKS
R19	120K	
R20	6.8meg	
R21	270Ω	
R22	22Ω	
R23	10Ω COLD	#65K540634
R24	4.5Ω COLD	#65K542967
R25	470Ω	

Motorola Part Number.

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		MOTOROLA PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Ant. Coil	24C535458 †						† Part of M2.
L2	RF Coil	24C535458 †						
L3	Osc. Coil	24C535456 †						
L4	Input IF Trans.	24K542491	16-6752	16-6752	BC-350	12-H1	RF-3	
L5	Output IF Trans.	24K542675	16-6754	16-6754	BC-354	12-H6		
L6	"A" Lead Choke	24A538914						

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	CURRENT (Measured)	DC RES.	INDUCTANCE (0 CURRENT 1000 ~)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L 7	.030A	2.8Ω	.037 Hy.	25B542849						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	5	1	25C542848						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE	REPLACEMENT DATA							NOTES
	PRI.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	20Ω CT tap @3-4Ω	25C542931							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	6" x 9"	PM	3-4Ω	50C541101	69A3	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	9A 32V	65R16248	1V541705	307009 (SFE 9A 32V)	155009	SFE9	HDH

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Tuner	77D561088	(AT-253) Complete
M3	Spark Plate	64K530177	
M4	Spark Plate	64K535152	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	1V538924	Control
Knob	36B472865	Tone
Knob	36K513169	Dummy
Pushbutton	1V543456	
Dial Pointer	1V543220	
Dial Scale	34B543217	
Dial Glass	61B543215	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
Use BELDEN No. 8524 (Stranded) Available in Ten Colors
Shielded Hook-up Wire ..... Use BELDEN No. 8885
Bonding Strap ..... Use BELDEN No. 8661

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

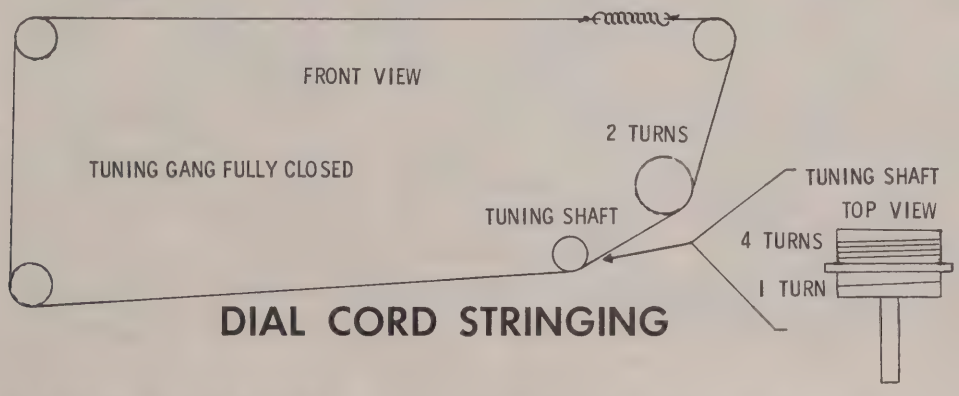
OLYMPIC CONTINENTAL MODEL GB376

OLYMPIC CONTINENTAL
MODEL GB376

OLYMPIC CONTINENTAL
MODEL GB376

TRADE NAME	Olympic-Continental Model GB376
MANUFACTURER	Olympic Radio & TV Inc., 34-01 38th Ave., Long Island City 1, N. Y.
TYPE SET	AC Operated 9 Tube FM-BC-SW Receiver With 4 Speed Automatic Record Changer
POWER SUPPLY	105-120 Volts AC, 60 Cycles (or) 200-230 Volts AC, 50 Cycles
RATING	70 Watts, .65 Amp. @117 Volts AC (FM); 60 Watts, .57 Amp. @117 Volts AC (Phono, Less Motor)
TUNING RANGE	BROADCAST 535-1620KC FREQ. MOD. 88-108MC SHORT WAVE 6-18MC

FOR SERVICE INFORMATION ON RECORD CHANGER PART #RXE30039 — SEE SIMILAR GARRARD RC121/MKII - PHOTOFACT SET 421 FOLDER 7



DIAL CORD STRINGING

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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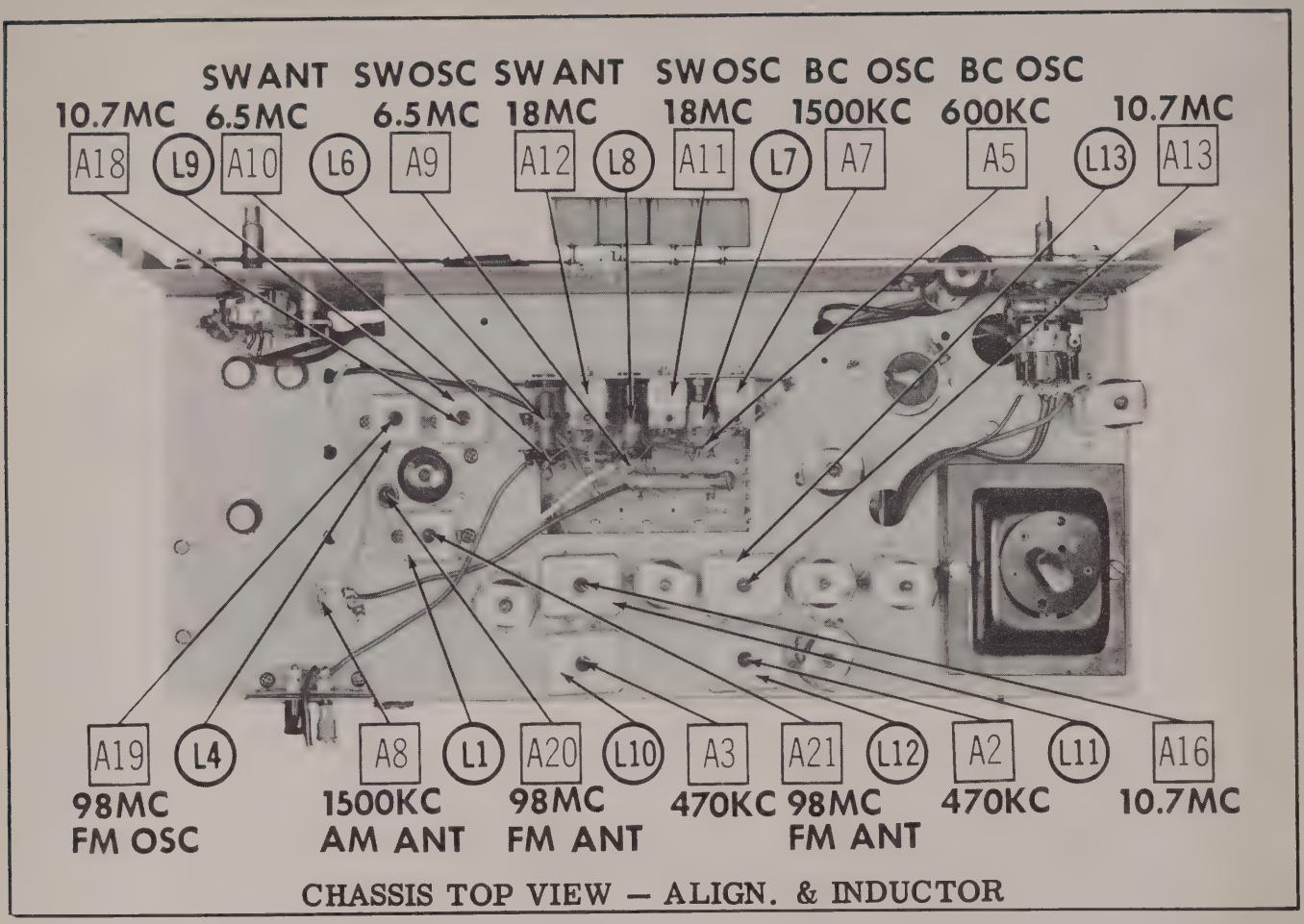
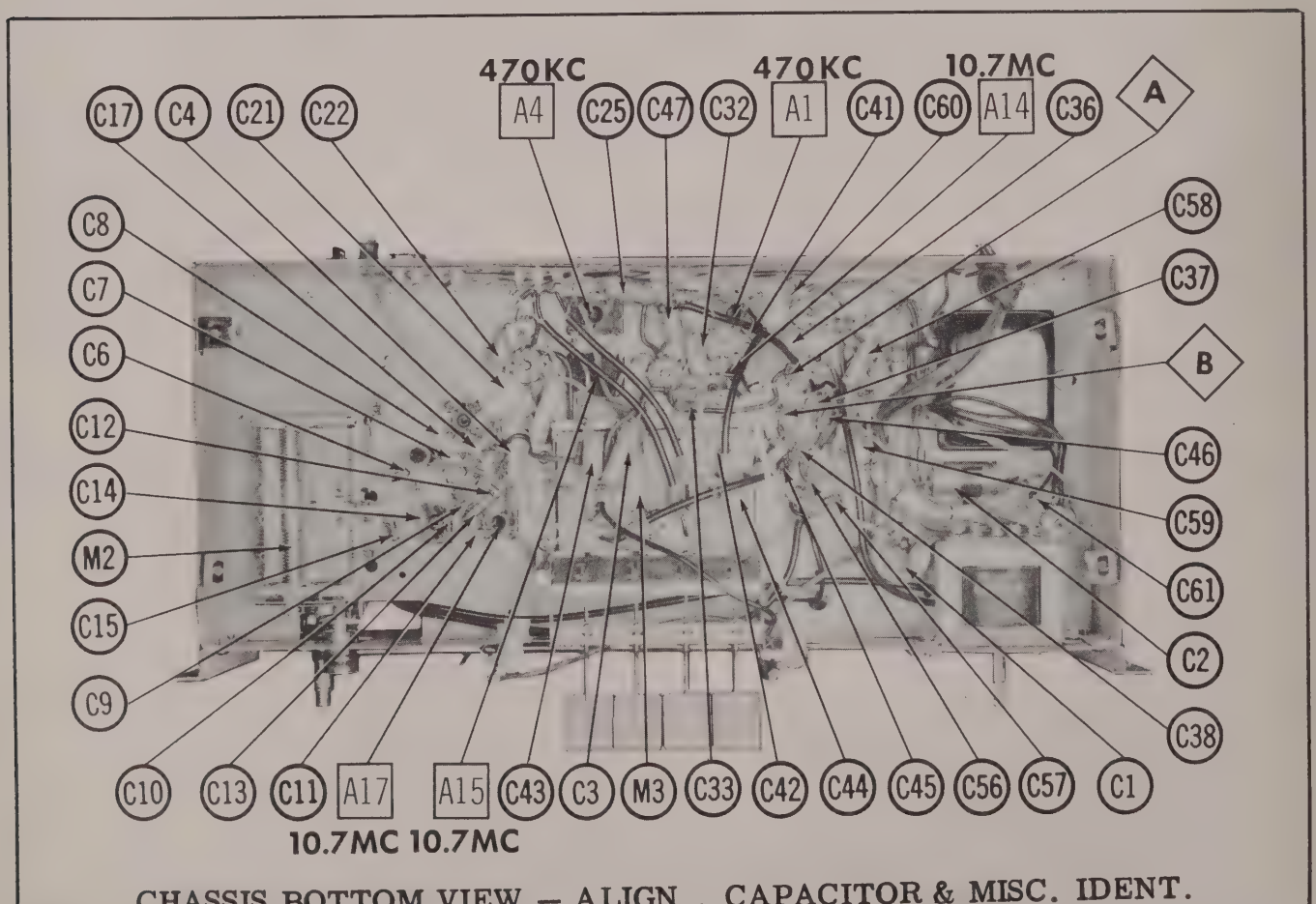
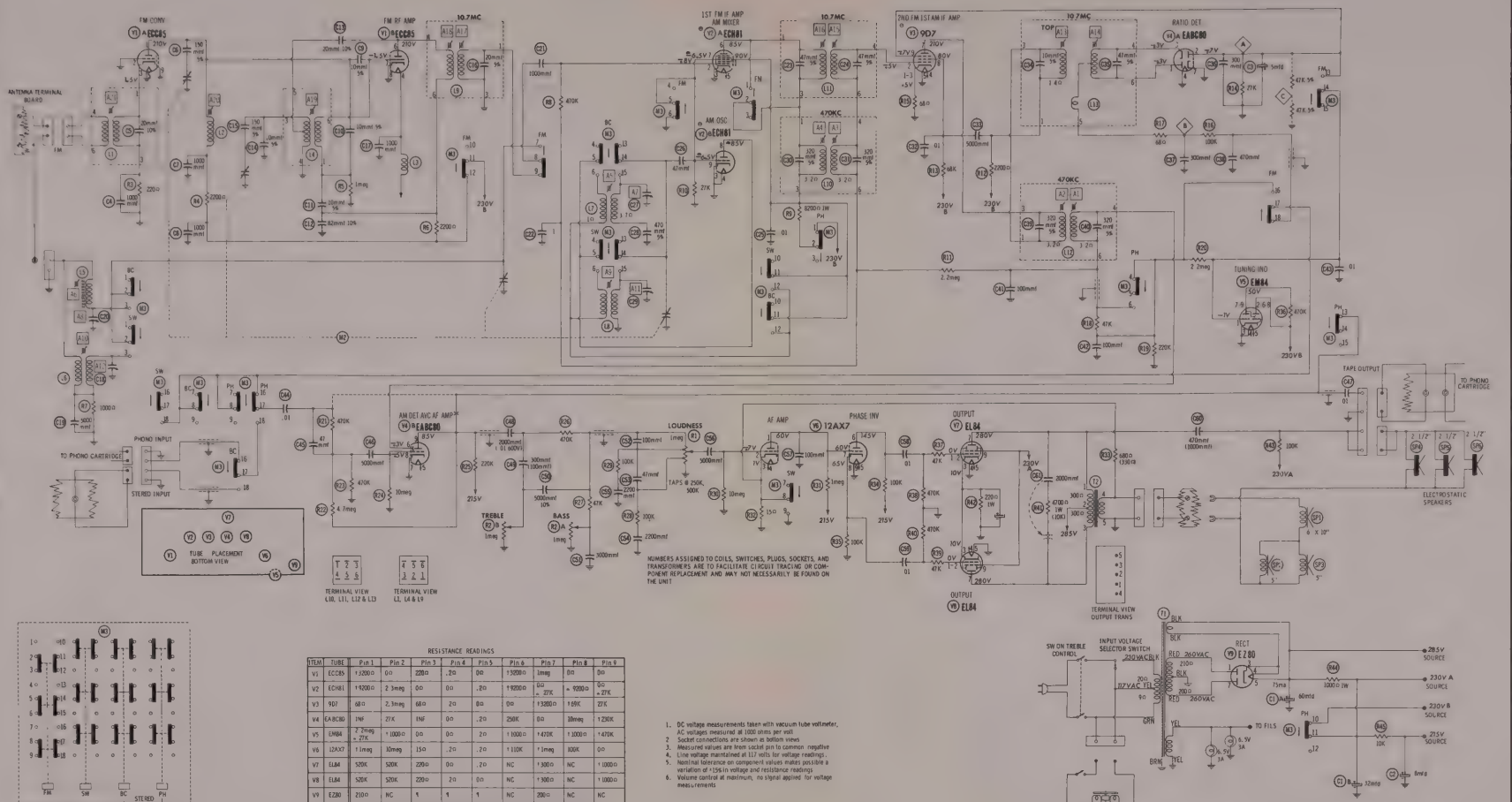
JN309



CHASSIS TOP VIEW — ALIGN. & INDUCTOR



CHASSIS BOTTOM VIEW — ALIGN., CAPACITOR & MISC. IDENT.



PUSHBUTTON SWITCHES (MS) SHOWN IN "FM" DEPRESSED

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC85	†2200Ω	0Ω	220Ω	.2Ω	0Ω	†500Ω	1meg	0Ω	0Ω
V2	ECH81	†920Ω	2.3meg	0Ω	0Ω	.2Ω	†920Ω	0Ω = 27K	= 920Ω	0Ω = 27K
V3	9D7	68Ω	2.3meg	68Ω	2Ω	0Ω	0Ω	†320Ω	†69K	27K
V4	EABC80	1MF	27K	1MF	0Ω	.2Ω	250K	0Ω	10meg	†250K
V5	EM84	2.2meg = 27K	†1000Ω	0Ω	0Ω	2Ω	†1000Ω	†470K	†1000Ω	†470K
V6	12AX7	†1meg	10meg	150Ω	.2Ω	.2Ω	†110K	†1meg	100K	0Ω
V7	EL84	520K	520K	220Ω	0Ω	.2Ω	NC	†300Ω	NC	†1000Ω
V8	EL84	520K	520K	220Ω	2Ω	0Ω	NC	†300Ω	NC	†1000Ω
V9	EZ80	210Ω	NC	¶	¶	¶	NC	200Ω	NC	NC

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
- ALL MEASUREMENTS TAKEN IN "FM" POSITION OTHERWISE DESIGNATED.
† MEASURED FROM PIN 3 OF V9
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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OLYMPIC CONTINENTAL
MODEL GB376

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
Suggested alignment tools: A1 thru A5, A9, A10.....GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A7, A8, A11, A12.....GENERAL CEMENT #9087, 9089
WALSCO #2528
A13 thru A21.....GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 2 (grid) of AM Mixer. Low side to chassis.	470KC (400∿ Mod.)	BC	600KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	600KC	"	"	"	A5, A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output. NOTE : Adjust A6 only if the loopstick has been disturbed or replaced.
3.		"	1500KC	"	1500KC	"	A7, A8	Adjust for maximum deflection.
4.	400Ω Carbon Resistor	High side thru 400Ω to AM antenna socket. Low side to chassis.	6.5MC	SW	6.5MC	"	A9, A10	"
5.	"	"	18MC	"	18MC	"	A11, A12	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 47K (±1%) resistors in series from point (A) to chassis. The junction of these two resistors is alignment point (C) as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	.05mfd	High side to pin 2 (grid) of 2nd FM IF Amp. Low side to chassis.	10.7MC (Unmod.)	FM	98MC	DC probe thru 100K to point (A). Common to chassis.	A13	Adjust for maximum deflection.
7.	"	"	"	"	"	DC probe thru 100K to point (B). Common to point (C).	A14	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
8.		Two turn loop around FM RF Amp.	"	"	"	DC probe thru 100K to point (A). Common to chassis.	A15, A16, A17, A18	Adjust for maximum deflection.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
6.	.05mfd	High side to pin 2 (grid) of 2nd FM IF. Low side to chassis.	10.7MC (450KC Swp)	FM	98MC	Vert. amp. thru 100K to point (A). Low side to chassis.	A13	Disconnect stabilizing capacitor C3. Adjust for maximum gain and symmetry of response similar to Fig. 1 with markers as shown.
7.	"	"	"	"	"	Vert. amp. thru 100K to point (B). Low side to chassis.	A14	Reconnect C3. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A13 for maximum amplitude and straightness of crossover lines.
8.		Two turn loop around FM RF Amp.	"	"	"	Vert. amp. thru 100K to point (A). Low side to chassis.	A15, A16, A17, A18	Disconnect C3. Adjust for maximum gain and symmetry of response similar to Fig. 1. Reconnect C3.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
9.	300Ω Carbon Resistor	Across FM antenna terminals with 300Ω in series with high side.	98MC (400∿ Mod.)	FM	98MC	Across voice coil	A19, A20, A21	Adjust for maximum deflection.

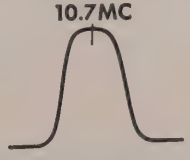
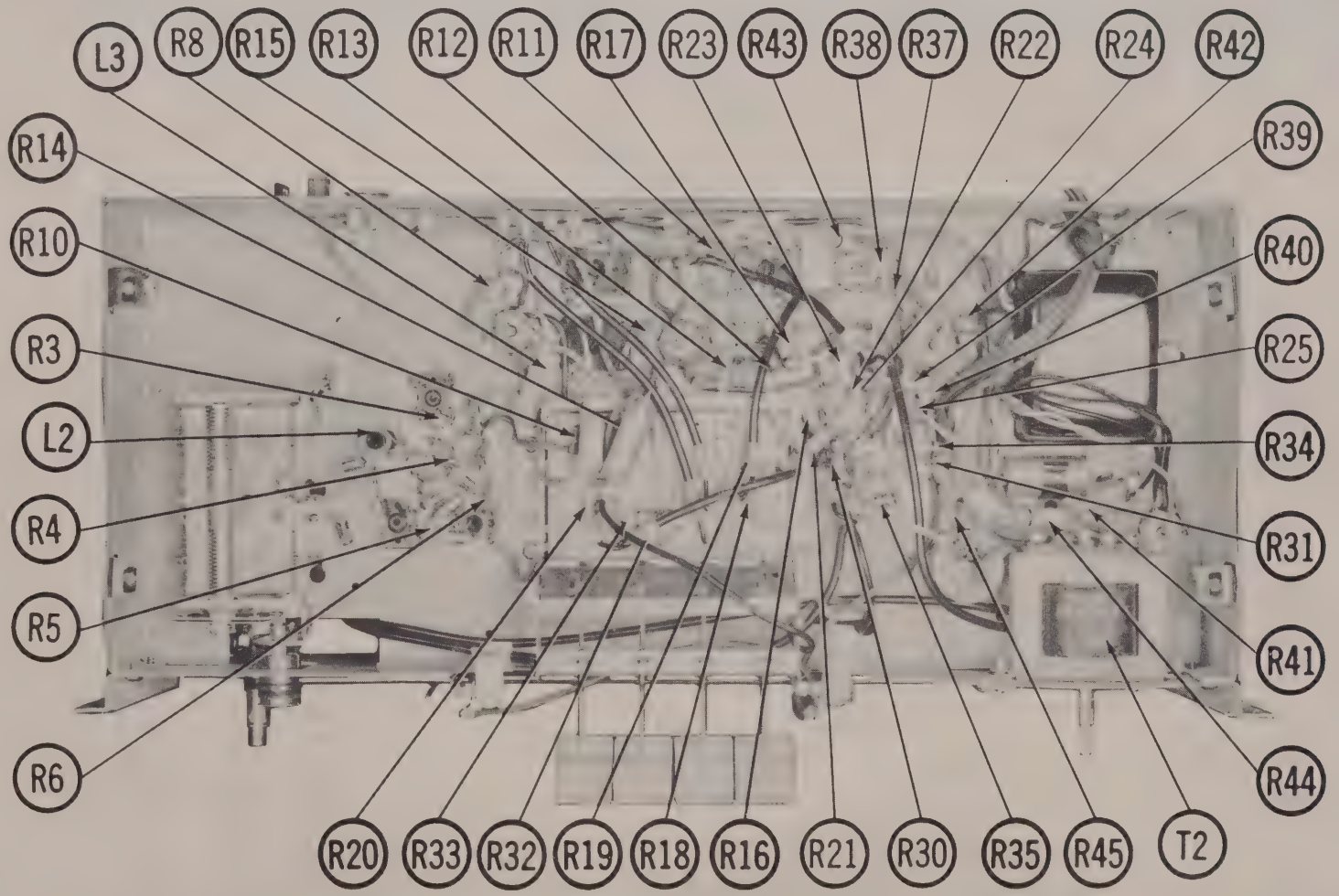


FIG. 1

FIG. 2



CHASSIS BOTTOM VIEW — RESISTOR & INDUCTOR IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •

ITEM No.	USE	TYPE
V1	FM RF Amp-FM Conv.	ECC85 (6AQ8) *
V2	1st FM IF Amp-AM Mixer AM Osc.	ECH81 (20D4 or 6AJ8) *
V3	2nd FM-1st AM IF Amp.	9D7 (6BY7) *
V4	Ratio Det. -AM Det. -AVC-AF Amp.	EABC80 (6AK8) *
V5	Tuning Indicator	EM84
V6	AF Amp-Phase Inv.	12AX7
V7	Output	EL84 (6BQ5) *
V8	Output	EL84 (6BQ5) *
V9	Rectifier	EZ80

* Alternate

ELECTROLYTIC CAPACITORS

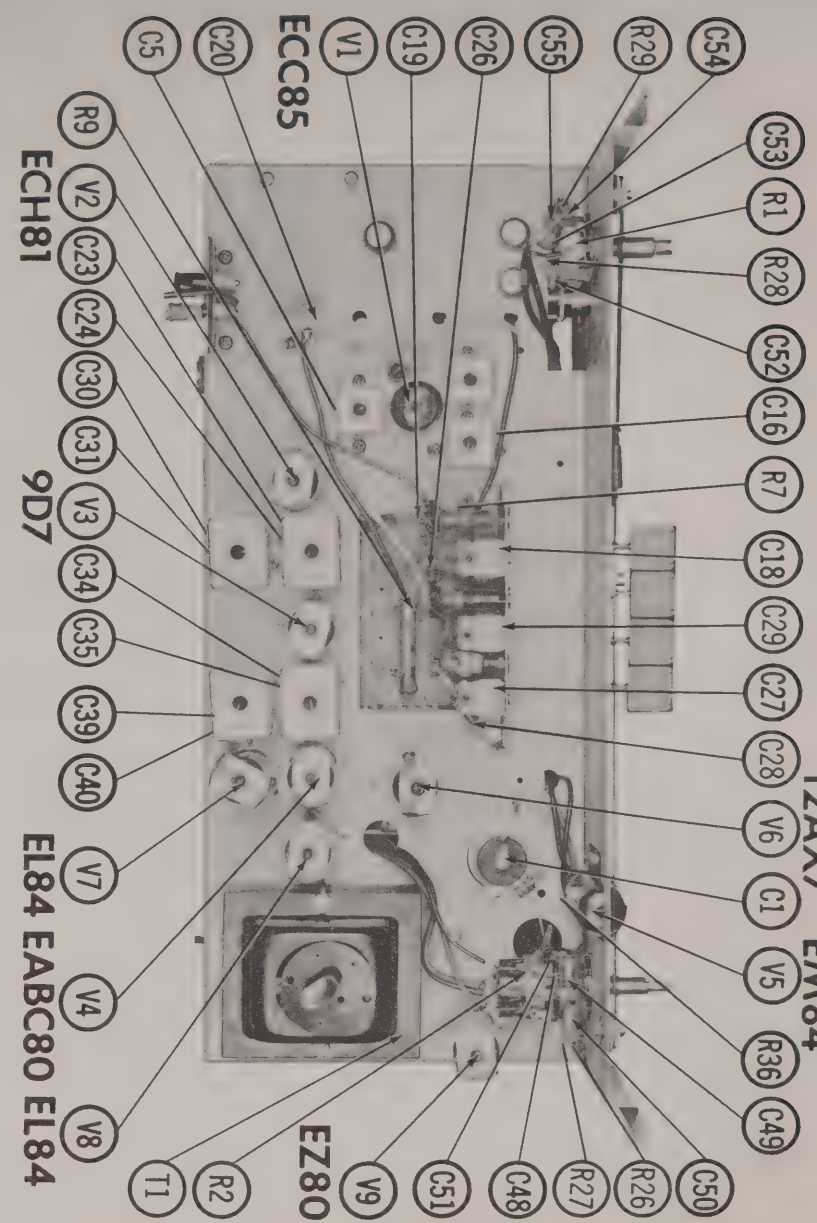
ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA OLYMPIC PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	60	300	COE25272	PR4-185	BR6035	TCD2302	TD-60-350	TVA-1613	
B	32	300			BR3035		TD-30-350	TVA-1610	
C2	8	300	COE30043	PRS350V8	BR835	TC61	TD-8-350	TVA-1603	
C3	5	50	COE25270	SRE50V5	NLW5-50	TT50X5	ML5-50	TE-1303	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	1000		SI 1000	D6-102	BYA10D1	CCD-102	UC-521	5HK-D1
C5	20 10%		ADM-15-200	DD-200	L10Q2	CCD-200	ZT-542	10TS-220
C6	150 5%		ADM-15-151	TCZ-150	22R5T15	CM-20B-151J	MCE236	MS-315
C7	1000		SI 1000	D6-102	BYA10D1	CCD-102	UC-521	5HK-D10
C8	1000		SI 1000	D6-102	BYA10D1	CCD-102	UC-521	5HK-D10
C9	10 5%		ADM-15-100	TCZ-10	C10Q1C	CM-20B-100J	CNO-410	10TCC-Q10
C10	10 5%		ADM-15-100	TCZ-10	C10Q1C	CM-20B-100J	CNO-410	10TCC-Q10
C11	10 5%		ADM-15-100	TCZ-10	C10Q1C	CM-20B-100J	CNO-410	10TCC-Q10
C12	82 10%		ADM-15-820	TCZ-82	C10Q82C	CCD-820	CNO-482	10TS-Q82
C13	20 10%		ADM-15-200	DD-200	L10Q2	CCD-200	ZT-542	10TS-Q20
C14	10 5%		ADM-15-100	TCZ-10	C10Q1C	CM-20B-100J	CNO-410	10TCC-Q10
C15	150 5%		ADM-15-151	TCZ-150	22R5T15	CM-20B-151J	MCE236	MS-315
C16	20 5%		ADM-15-200	DD-200	L10Q2	CM-20B-200J	ZT-542	10TCC-Q20
C17	1000		SI 1000	D6-102	BYA10D1	CCD-102	UC-521	5GA-D10
C18		#CTE25245						
C19	5000		SI 5000	D6-502	BYA10D5	CCD-502	UC-525	5HK-D50
C20		#CTE25245						
C21	1000		SI 1000	D6-102	DYA10D1	CCD-102	UC-521	5HK-D10
C22	.1 350V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C23	47 5%		ADM-15-470	TCZ-47	C10Q47C	CM-20B-470J	CNO-447	10TCC-Q47
C24	47 5%		ADM-15-470	TCZ-47	C10Q47C	CM-20B-470J	CNO-447	10TCC-Q47
C25	.01 350V		P488N-01	DD-103	BYA10S1	4DP-1-103	GEM-411	4TM-S1
C26	47		SI 47	D6-470	L10Q47	CCD-471	UC-5447	5GA-Q47
C27		#CTE25245						
C28	470 5%		ADM-15-471		22R5T47	CM-20B-470J		10TS-T47
C29		#CTE25245						
C30	320 5%		ADM-15-321			CM-20B-331J		10TS-T33
C31	320 5%		ADM-15-321			CM-20B-331J		10TS-T33
C32	.01 500V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C33	5000		SI 5000	D6-502	BYA10D5	CCD-502	UC-525	5HK-D50
C34	10 5%		ADM-15-100	TCZ-10	C10Q1C	CM-20B-100J	CNO-410	10TCC-Q10
C35	47 5%		ADM-15-470	TCZ-47	C10Q47C	CM-20B-470J	CNO-447	10TCC-Q47
C36	300		ADM-15-301	TCZ-300	22R5T3	CCD-331	UC-533	5GA-T30
C37	300		ADM-15-301	TCZ-300	22R5T3	CCD-331	UC-533	5GA-T30
C38	470		SI 470	D6-471	L10T47	CCD-471	UC-5347	5GA-T47
C39	320 5%		ADM-15-321			CM-20B-331J		10TS-T33
C40	320 5%					CM-20B-331J		10TS-T33
C41	100		SI 100	D6-101	L10T1	CCD-101	UC-531	5GA-T10
C42	100		SI 100	D6-101	L10T1	CCD-101	UC-310	5GA-T10
C43	.01 500V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C44	.01 500V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C45	47		SI 47	D6-470	L10T47	CCD-471	UC-5447	5GA-Q47
C46	5000		BPD-005	DD-502	BYA10D5	CCD-502	UC-525	5HK-D50
C47	.01 400V		P488N-01	DD-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1

CHASSIS—TOP VIEW



OLYMPIC CONTINENTAL
MODEL GB376

PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C48	2000 (.01 600V)	①	SI 2000	D6-202	BYA10D2	CCD-202	UC-522	5HK-D20
C49	300 (100mmf)	②	SI 300	D6-301	L10T3	CCD-301	UC-533	5GA-T30
C50	5000 10%		ADM-20-502		PM6D5	CCS-502	GTM625	6TM-D5
C51	3000		SI 3000	D6-302	BYA10D3	CCD-302	UC-523	5GA-D30
C52	100		SI 100	D6-101	L10T1	CCD-101	UC-531	5GA-T10
C53	47		SI 47	D6-470	L10Q47	CCD-470	UC-5447	5GA-Q47
C54	2200		SI 2200	D6-222	BYA10D22	CCD-222	UC-222	5HK-D22
C55	2200		SI 2200	D6-222	BYA10D22	CCD-222	UC-222	5HK-D22
C56	5000		SI 5000	D6-502	BYA10D5	CCD-502	UC-525	5HK-D50
C57	100		SI 100	D6-101	L10T1	CCD-101	UC-531	5GA-T10
C58	.01 500V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C59	.01 500V		P688N-01	DD-103	CUB6S1	6DP-2-103	GEM-611	6TM-S1
C60	470 (1000mmf)	③	SI 470	D6-471	L10T47	CCD-471	UC-5347	5GA-T47
C61	2000		SI 2000	D6-202	BYA10D2	CCD-202	UC-522	5HK-D20

Olympic Part Number

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	OLYMPIC PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	1meg †	1/2	PTE30050	BT-165 *		Q18-137XX*	UDT-289 *	Loudness
R2A	1meg	1/2	PTE30049	F1-52		QJ-1116R ■	UE4046-S ▲	Bass
B	1meg	1/2		R2-52				Treble
C	Switch	1/2		KR-2				Off-On

† Taps ⓐ 250K, 500K
* Saw or file groove in shaft 1/4" from end.
■ "Concentrikit" equivalent: K-6 Kit with base elements & shafts: B13-137, P17-031 (Panel)
B13-137, R9-110 (Rear)
76-2 (Switch)
▲ "STA-LOC" equivalent: FA16A, RU16A, OS1000A, IS1437, US42

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	220Ω	
R4	2200Ω	
R5	1meg	
R6	2200Ω	
R7	1000Ω	
R8	470K	
R9	8200Ω 1W	
R10	27K	
R11	2.2meg	
R12	2200Ω	
R13	68K	
R14	27K	
R15	68Ω	
R16	100K	
R17	68Ω	

* Alternate

ITEM No.	RATING	REMARKS
R18	47K	
R19	220K	
R20	2.2meg	
R21	470K	
R22	4.7meg	
R23	470K	
R24	10meg	
R25	220K	
R26	470K	
R27	47K	
R28	100K	
R29	100K	
R30	10meg	
R31	1meg	
R32	15Ω	

ITEM No.	RATING	REMARKS
R33	680Ω	(330Ω) *
R34	100K	
R35	100K	
R36	470K	
R37	47K	
R38	470K	
R39	47K	
R40	470K	
R41	4700Ω 1W	(10K) *
R42	220Ω 1W	
R43	100K	
R44	1000Ω 1W	
R45	10K	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		OLYMPIC PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Trans.	TRE25242						
L2	FM RF Coil	CLE30052						
L3	Fil. Choke	CKE25260	19-1001	19-1001	BC-562	4604		1.4uh
L4	FM Osc. Coil	CLE25253						
L5	Loopstick	LPE25259						
L6	SW Ant. Coil	CLE25252						
L7	BC Osc. Coil	CLE25255						
L8	SW Osc. Coil	CLE25251						
L9	1st FM IF	TRE25241						
L10	1st AM IF	TRE25239						

COILS (RF-IF) (cont)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		OLYMPIC PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L11	2nd FM IF	TRE25237						
L12	2nd AM IF	TRE25240						
L13	Ratio Detector	TRE25238						

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	220V Tap ⓐ 117V ⓐ .65A	520 VCT ⓐ .075A	6.3V ⓐ .6A	TRE25244						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V ⓐ 3.5A									

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	OLYMPIC PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	10K CT	6-8Ω	TRE25243	24S56①	A-2901①	AU-600①	A-3831①	24S56 ①	S-53X①	① Use Original Frame

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	OLYMPIC PART No.	QUAM PART No.	
SP1	6"x 10"	PM	3-4Ω	SKE30036①		① Connect in series with SP2 and SP3 and phase.
SP2	5"	PM	3-4Ω	SKE30037 ②	5A07②	② Parallel and Phase.
SP3	5"	PM	3-4Ω	SKE30037 ②	5A07 ②	
SP4	2½"	Electrostatic		SKE25268		
SP5	2½"	Electrostatic		SKE25268		
SP6	2½"	Electrostatic		SKE25268		

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA								
	OLYMPIC PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M1		93-T	Not Req.	56	Not Req.				

MISCELLANEOUS

ITEM No.	PART NAME	OLYMPIC PART No.	NOTES
M2 M3	Tuning Cap Switch	CVE30046	4 Gang (Ant. 5—567mmf, Osc. 5—570mmf) Function

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

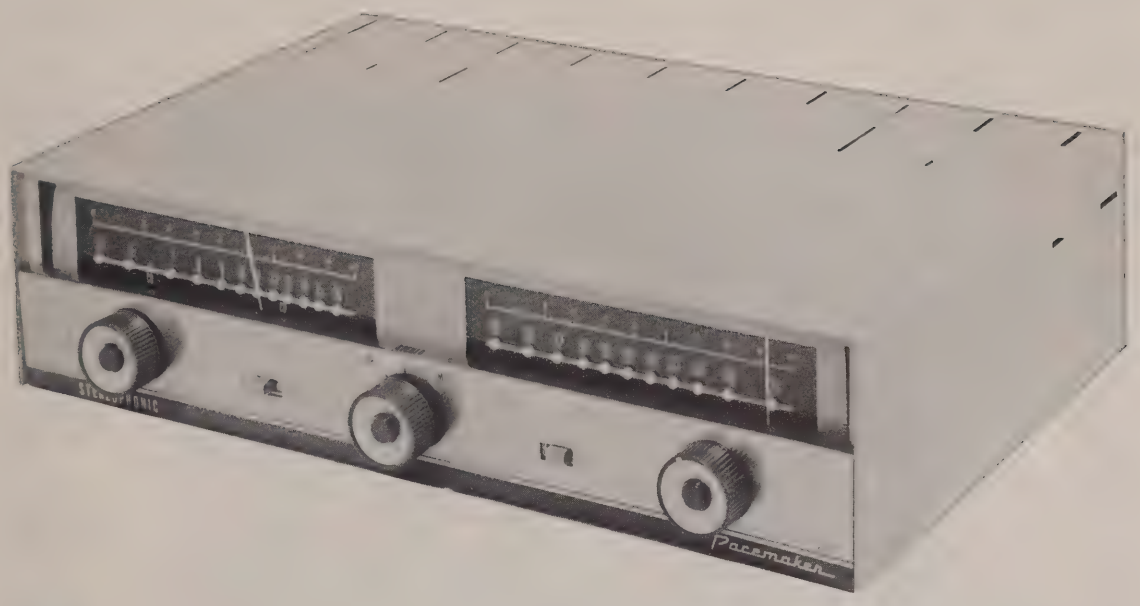
NAME	PART NO.	DESCRIPTION
Knob	KNE-30051	Tuning
Knob	KNE-25248	Volume
Knob	KNE-25249	Bass
Knob	KNE-25250	Treble
Pointer	POE-25257	
Dial Glass	DLE-30053	
Cabinet	CAE-30038	

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PACEMAKER
MODEL 2222

PACEMAKER
MODEL 2222

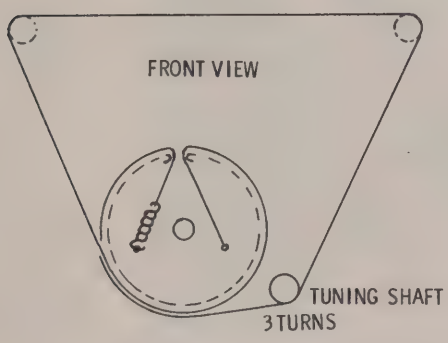


PACEMAKER
MODEL 2222

TRADE NAME	Pacemaker Model 2222		
MANUFACTURER	Bell Sound Div., Thompson Ramo Wooldridge Inc., 555 Marion Road, Columbus, Ohio		
TYPE SET	AC Operated 10 Tube FM-AM Tuner		
POWER SUPPLY	110-120 Volts AC, 60 Cycles	RATING	39 Watts, .43 Amp. @ 117 Volts AC (FM-AM)
TUNING RANGE	BROADCAST 535 - 1650KC	FREQ. MOD.	88 - 108MC

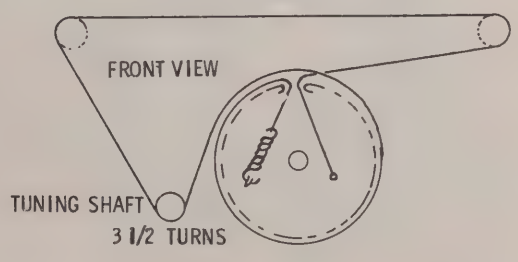
DIAL CORD STRINGING

FM



TUNING GANG FULLY CLOSED

AM



TUNING GANG FULLY CLOSED

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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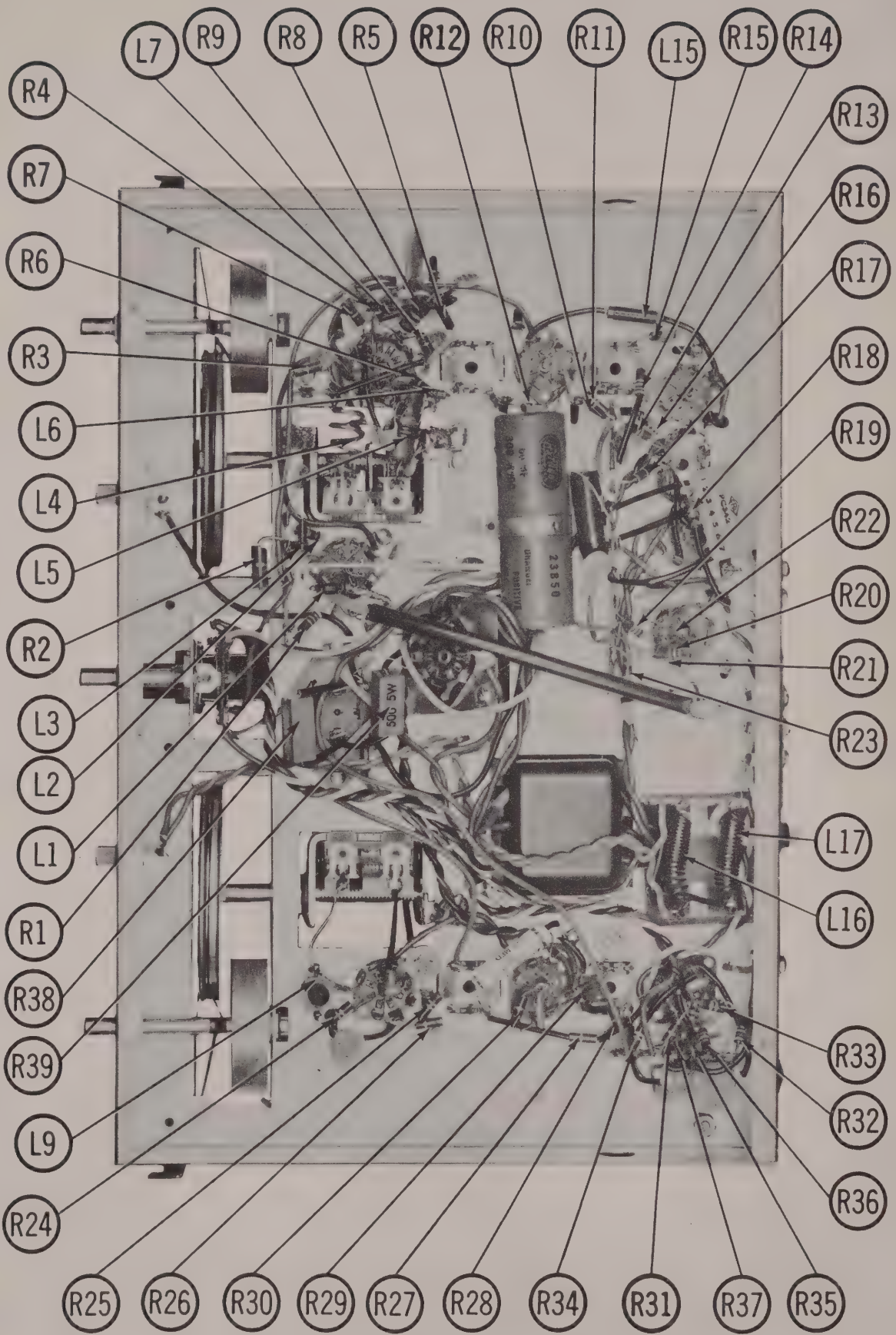
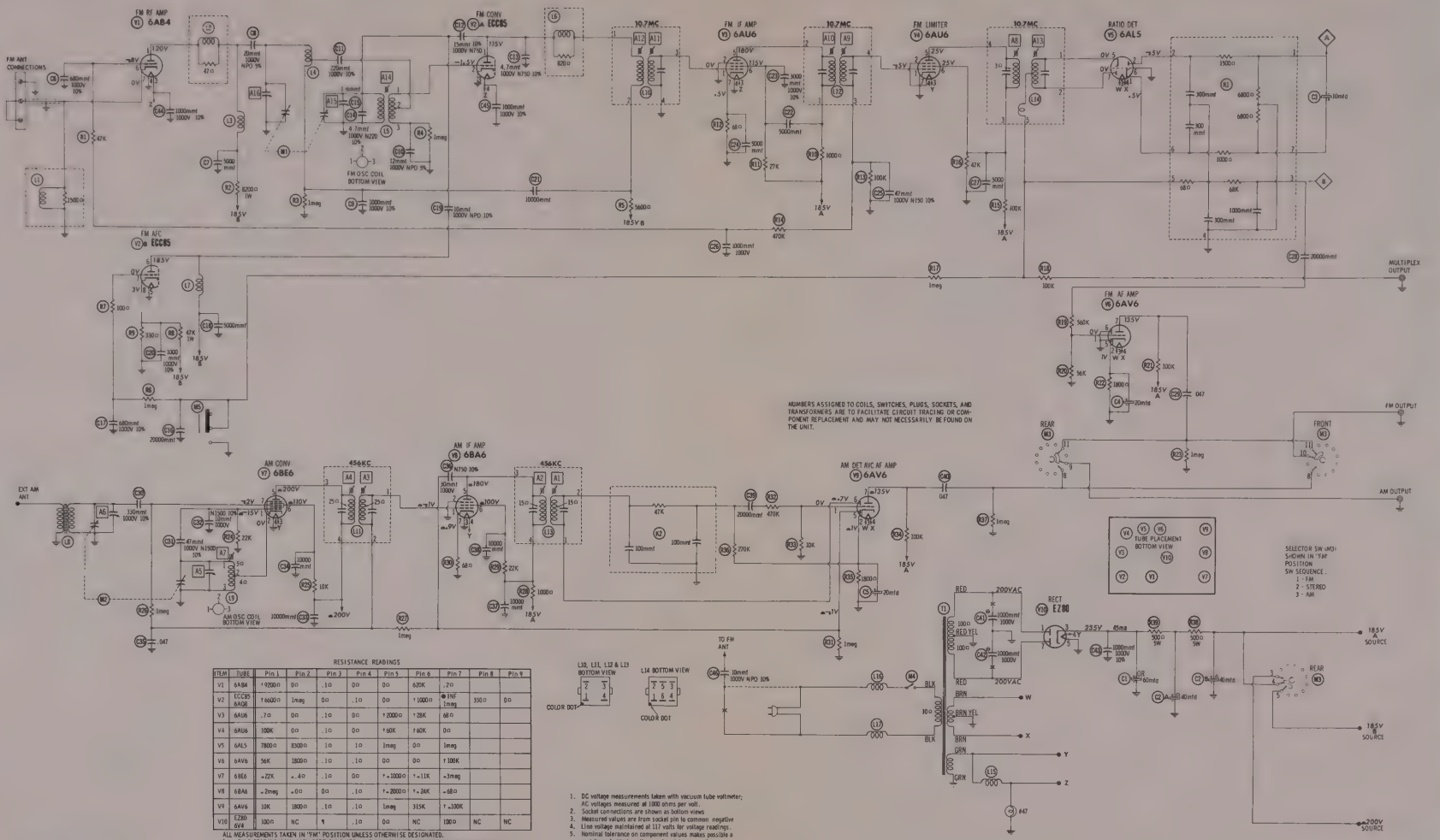


CHASSIS-BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6AB4	†9200Ω	0Ω	.1Ω	0Ω	0Ω	620K	.2Ω		
V2	ECC85 6AQ8	†6600Ω	1meg	0Ω	.1Ω	0Ω	†1000Ω	●INF 1meg	350Ω	0Ω
V3	6AU6	.7Ω	0Ω	.1Ω	0Ω	†2000Ω	†2BK	68Ω		
V4	6AU6	100K	0Ω	.1Ω	0Ω	†60K	†60K	0Ω		
V5	6AL5	7800Ω	8300Ω	1Ω	1Ω	1meg	0Ω	1meg		
V6	6AV6	56K	1800Ω	.1Ω	.1Ω	0Ω	0Ω	†100K		
V7	6BE6	≈22K	≈.4Ω	.1Ω	0Ω	†≈10000Ω	†≈11K	≈3meg		
V8	6BA6	≈2meg	≈0Ω	0Ω	.1Ω	†≈20000Ω	†≈26K	≈68Ω		
V9	6AV6	10K	1800Ω	.1Ω	.1Ω	1meg	315K	†≈100K		
V10	EZ80 6V4	100Ω	NC	¶	.1Ω	0Ω	NC	100Ω	NC	NC

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED.
¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 3 OF V10.
≈ MEASURED IN "AM" POSITION.
● MEASURED IN "FM-M/C" POSITION. NC NO CONNECTION

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±5% in voltage and resistance readings
6. No signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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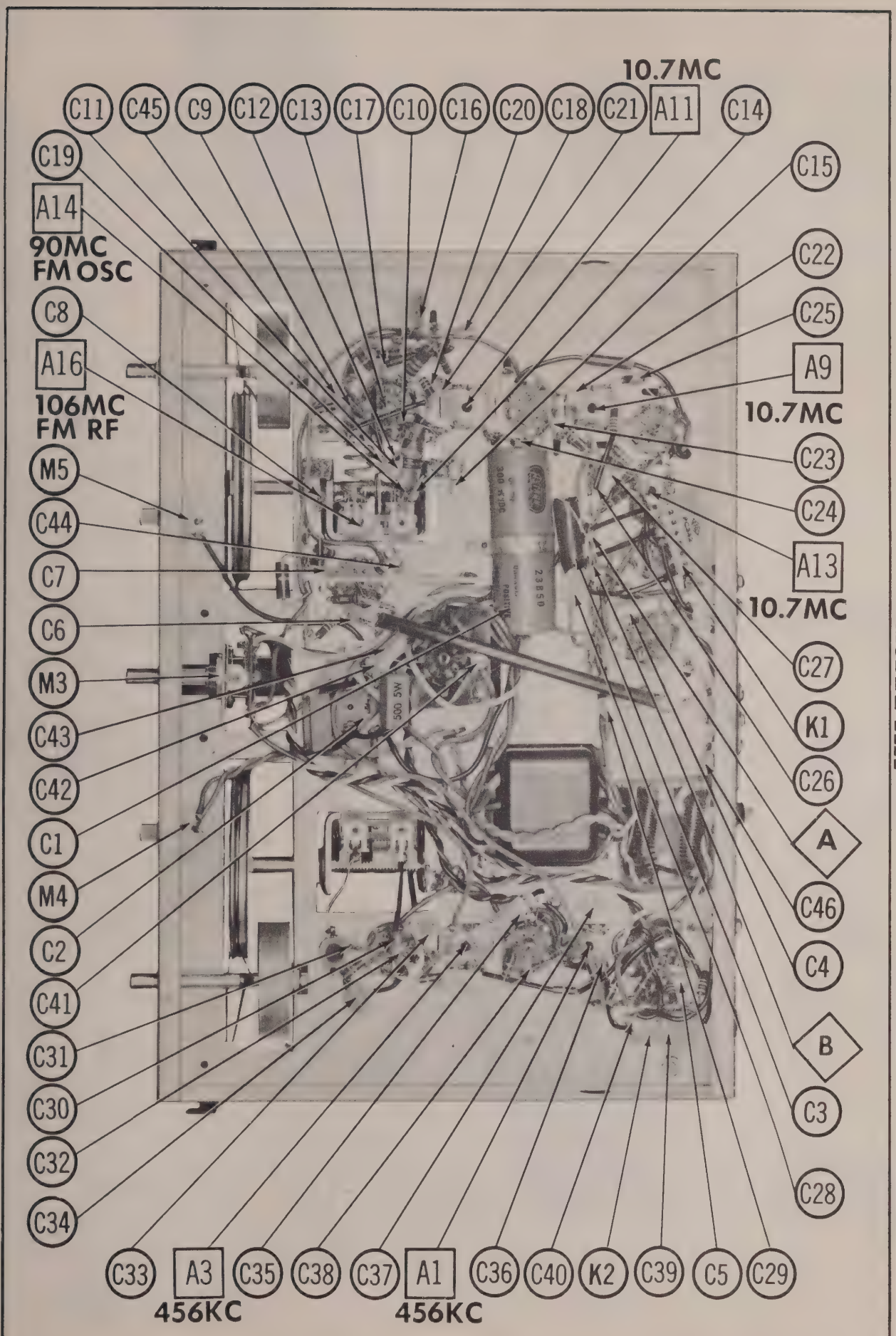
PACEMAKER MODEL 2222



CHASSIS BOTTOM VIEW-CAPACITOR, MISC. AND ALIGNMENT IDENT

PACEMAKER
MODEL 2222

FOLDER 10

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools:

A1 thru A4, A8 thru A13	GENERAL CEMENT #5097, 8727 WALSCO #2515
A5, A6, A15, A16	GENERAL CEMENT #5004, 5008, 5009 WALSCO #2520
A7	GENERAL CEMENT #8606, 8606L, 8282, 9295 WALSCO #2526, 2543, 2544, 2545
A14	GENERAL CEMENT #8721, 8722 WALSCO #2519

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.01mfd	High side to pin 7 (grid) of AM Converter. Low side to chassis.	456KC (400∿ Mod.)	AM	Tuning gang fully open	AC probe to AM Output Jack. Low side to chassis.	A1, A2, A3, A4	Adjust for maximum output.
2.	200mmf	High side thru 200mmf to AM antenna terminal. Low side to chassis.	1400KC	"	1400KC	"	A5, A6	"
3.	"	"	600KC	"	Tune to 600KC signal	"	A7	Adjust for maximum output while rocking tuning gang. Repeat steps 2 and 3 until no further improvement is obtained.

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	10mmf Ceramic Capacitor	High side to RF stator lug of FM tuning gang. Low side to chassis.	10.7MC (Unmod.)	FM (AFC Off)	Point of non-interference	DC probe thru 100K to point Ⓐ. Common to chassis.	A8, A9, A10, A11, A12	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe to to point Ⓑ. Common to chassis.	A13	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60∿ modulation and 450KC sweep. Use 120∿ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	10mmf Ceramic Capacitor	High side to RF stator lug of FM tuning gang. Low side to chassis.	10.7MC (450KC Swp)	FM (AFC Off)	Point of non-interference	Vert. Amp. thru 100K to point Ⓐ. Low side to chassis.	A8, A9, A10, A11, A12	Disconnect stabilizing capacitor C3. Adjust for maximum gain and symmetry similar to Fig. 1.
5.	"	"	"	"	"	Vert. Amp. thru 100K to point Ⓑ. Low side to chassis.	A13	Reconnect C3. Adjust to place marker at the center of crossover lines similar to Fig. 2. SLIGHTLY retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

Turn tuning gang fully closed and set pointer at "0" on Log Scale.
Adjustments must be made so that calibration is correct when bottom cover is in place.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
6.	270Ω Carbon Resistor	Across FM antenna terminals with 270Ω in high side.	90MC (Unmod.)	FM (AFC Off)	90MC	DC probe thru 100K to point Ⓐ. Common to chassis.	A14	Adjust for maximum deflection.
7.	"	"	106MC	"	106MC	"	A15, A16	"
8.	"	"	90MC	"	90MC	"	L4	Adjust for maximum deflection by compressing or expanding coil turns. Repeat steps 6, 7 and 8.

FIG. 1

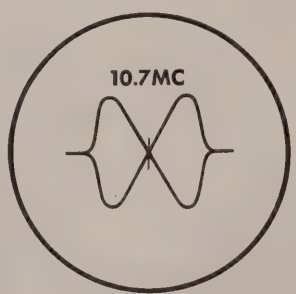


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	FM RF Amplifier	6AB4	V6	FM AF Amplifier	6AV6
V2	FM Converter - AFC	ECC85/6AQ8	V7	AM Converter	6BE6
V3	FM IF Amplifier	6AU6	V8	AM IF Amplifier	6BA6
V4	FM Limiter	6AU6	V9	AM Det. - AVC Rect. - AM AF Amplifier	6AV6
V5	Ratio Detector	6AL5	V10	Rectifier	EZ80/6V4

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	BELL SOUND PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	60	300	23B50	PRS1690	BR6035	TC68	TD-60-350	TVA-1613	
C2A	▲40	300	23B49		A0516 }	FP217.87		TVL-3577	
B	▲40	300			BR4035 }				
C3	10	50	23B45	SRE50V10	NLW10-50	TT50X10	ML10-50	TE-1304	
C4	20	6	23B8	XPP-6020	NLW20-6	TT15X20	ML20-6	TE-1090	
C5	20	6	23B8	XPP-6020	NLW20-6	TT15X20	ML20-6	TE-1090	

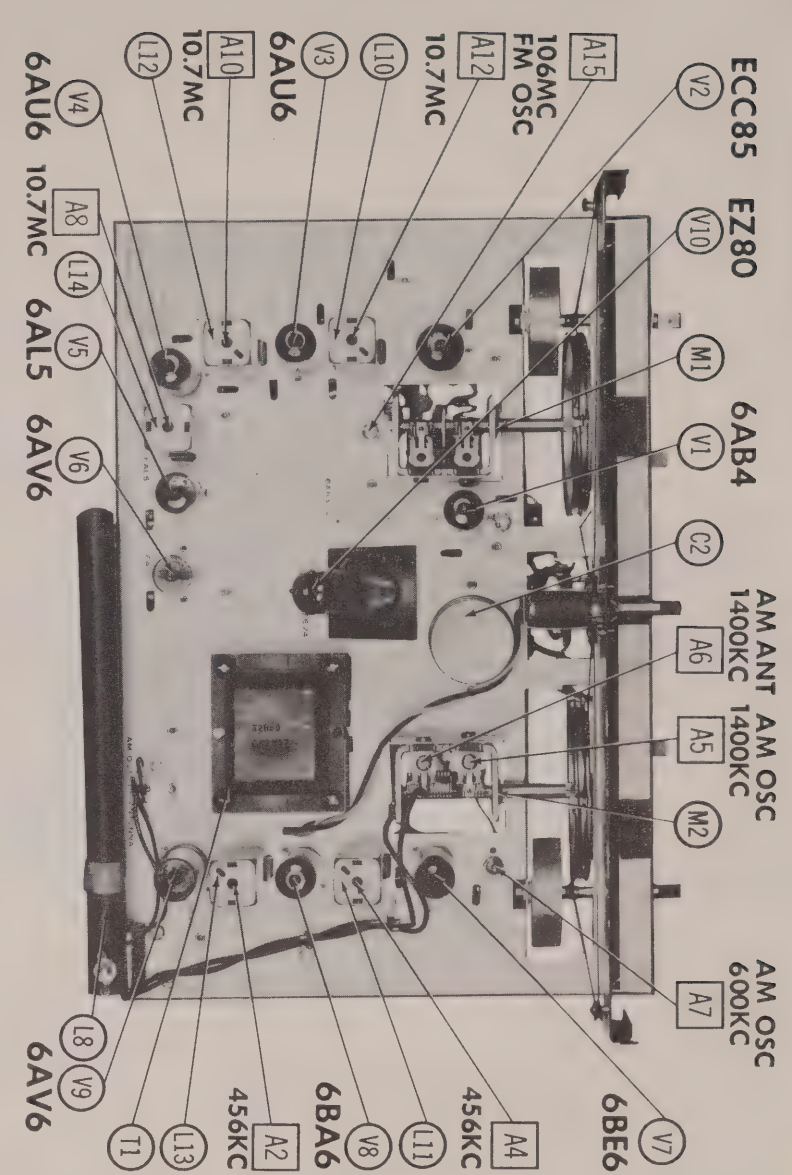
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C6	680 1000V 10%		DI-680	DD-681	22R5T68	CCS-681	JL-368	10TS-T68
C7	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D5
C8	20 1000V NPO 5%				C10Q2C	CM-15-C-200J	CNO-420	10TCC-Q20
C9	1000 1000V 10%		DI-1000	DD-102	1R5D1	CCS-102	JL-210	10TS-D10
C10	12 1000V NPO 5%				C10Q12C	CM-15-C-120J	CNO-412	10TCC-Q12
C11	220 1000V 10%		DI-220	DD-221	L10T22	CCD-221	JL-322	10TS-T22
C12	15 1000V N750 10%				C10Q15U	CCTN-150	CN7-415	10TCU-Q15
C13	4.7 1000V N750 10%					CCTN-050	CN7-547	10TCU-V50
C14	4.7 1000V N220 10%	#24B93				*		10TCR-V47
C15	1-6	#25A8		829-6				
C16	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C17	680 1000V 10%		DI-680	DD-681	22R5T68	CCS-681	JL-368	10TS-T68
C18	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C19	10 1000V NPO 10%				C10Q1C	CCTO-100	CNO-410	10TCC-Q10
C20	1000 1000V 10%		DI-1000	DD-102	1R5D1	CCS-102	JL-210	10TS-D10
C21	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C22	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C23	3000 1000V 10%		DI-3000		1R5D3	CCS-302	B-233	10TS-D30
C24	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C25	47 1000V N150 10%	#24B87				*		10TCP-Q47
C26	1000 1000V		BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C27	5000		BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C28	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C29	.047 400V		P488N-047	DF-503	CUB4S47	4DP-1-473	GEM-4147	4TM-S47
C30	330 1000V 10%		DI-330	DD-331	L10T33	CCS-331	JL-333	10TS-T33
C31	47 1000V N1500 10%	#24B87				*		
C32	10 1000V N1500 10%	#24B86				*		
C33	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C34	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C35	.047 400V		P488N-047	DF-503	CUB4S47	4DP-1-473	GEM-4147	4TM-S47
C36	30 1000V N750 10%				C10Q3U	CCTN-330		
C37	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C38	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C39	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C40	.047 500V		P688N-S47	DF-503	CUB6S47	6DP-1-473	GEM-6147	6TM-S47
C41	1000 1000V	①	BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C42	1000 1000V	①	BPD-001	DD-102	BYA10D1	CCD-102	B-210	5HK-D10
C43	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C44	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C45	1000 1000V 10%		DI-1000	DD-102	PM6D1	CCS-102	JL-210	10TS-D10
C46	10 1000V NPO 10%		NPO-DI 10		C10Q1C	CCTO-100	CNO-410	10TCC-Q10

① Not used in some versions. # Bell Sound Part Number.
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R1	47K	
R2	8200Ω 1W	
R3	1meg	
R4	1meg	
R5	5600Ω	
R6	1meg	
R7	100Ω	
R8	47K 1W	
R9	330Ω	
R10	1000Ω	
R11	27K	
R12	68Ω	
R13	100K	

ITEM No.	RATING	REMARKS
R14	470K	
R15	100K	
R16	47K	
R17	1meg	
R18	100K	
R19	560K	
R20	56K	
R21	100K	
R22	1800Ω	
R23	1meg	
R24	22K	
R25	10K	
R26	1meg	

ITEM No.	RATING	REMARKS
R27	1meg	
R28	1000Ω	
R29	22K	
R30	68Ω	
R31	1meg	
R32	470K	
R33	10K	
R34	100K	
R35	1800Ω	
R36	270K	
R37	1meg	
R38	500Ω 5W	
R39	500Ω 5W	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		BELL SOUND PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	FM Ant. Coil	31A20						①
L2	RF Choke	31A31						②
L3	RF Choke	31A24	19-2006	19-2006	BC-560	4590		.68uh
L4	FM RF Coil	31B28						
L5	FM Osc. Coil	31B29						
L6	RF Choke	31A19						③
L7	RF Choke	31A22	19-1002	19-1002	BC-563	4606		2.5uh
L8	Loopstick	31A30						
L9	AM Osc. Coil	31A26	14-1055	14-1055	BC-393			
L10	1st FM IF Trans.	32C44	16-3487	16-3487	FM-254	1463		
L11	1st AM IF Trans.	32C67	16-6758	16-6758	BC-352	12-C1	RF-1	
L12	2nd FM IF Trans.	32C24	16-3487	16-3487	FM-254	1463		
L13	2nd AM IF Trans.	32C25	16-6758	16-6758	BC-353	12-C2	RF-2	
L14	Ratio Detector	32C66	17-3498	17-3498	FM-255	1465		
L15	Fil. Choke	31A21	19-1003	19-1003	BC-564	4608		
L16	Line Choke	31B8						
L17	Line Choke	31B8						

① Wound on 1500Ω Resistor. ② Wound on 47Ω Resistor. ③ Wound on 820Ω Resistor.

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	BELL SOUND PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .47A	400VCT @ .045A	6.3VCT @ .8A	32B59						
	SEC. 3	SEC. 4	SEC. 5							
	6.3V @ 2.5A									

MISCELLANEOUS

ITEM No.	PART NAME	BELL SOUND PART No.	NOTES
M1	Tuning Cap.	25B10	FM, 2 gang
M2	Tuning Cap.	25B11	AM, 2 gang (Ant. 19-377mmf, Osc. 17-125mmf)
M3	Switch	43B48	Function (Rotary Wafer Type)
M4	Switch	43A51	Power Off-On, (SPDT Slide Type)
M5	Switch	43A51	AFC (SPDT Slide Type)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	BELL SOUND PART No.	REPLACEMENT DATA
K1	FM Ratio Detector	300mmf, 300mmf, 300mmf, 1000mmf, 68Ω, 1000Ω, 1500Ω, 6800Ω, 6800Ω, 68K	57A14	Centralab PC-342
K2	AM Detector Filter	100mmf, 100mmf, 47K	57A2	Aerovox PA-97 Centralab PC-50 Cornell-Dubilier 111TM1 Sprague D-1

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	84A31	Tuning
Knob	84A32	Function
Dial Pointer	72A229	
Dial Glass	94B35	

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PHILCO MODELS T-7X (Code 128), T-75 (Code 124)

PHILCO MODELS T-7X (Code 128), T-75 (Code 124)

MODEL T-75

PHILCO MODELS T-7X (Code 128), T-75 (Code 124)

TRADE NAME	Philco Models T-7X (Code 128), T-75 (Code 124)
MANUFACTURER	Philco Corp., Tioga & C Streets, Philadelphia, Pa.
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	3 Volts DC
RATING	20MA @ 3 Volts DC (No Signal, Min. Volume)
TUNING RANGE—BROADCAST	535-1620KC
	30MA @ 3 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1 thru A5 ... GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544
A6, A7 ..... GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to antenna stator lug of tuning gang. Low side to chassis.	455KC (400~ Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.		Loop	600KC	600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1620KC	Tuning gang fully open	"	A6	"
4.		"	1400KC	Tune to 1400KC signal	"	A7	Adjust for maximum output. Repeat steps 2, 3 and 4 until no further improvement is obtained. Make step 4 last step.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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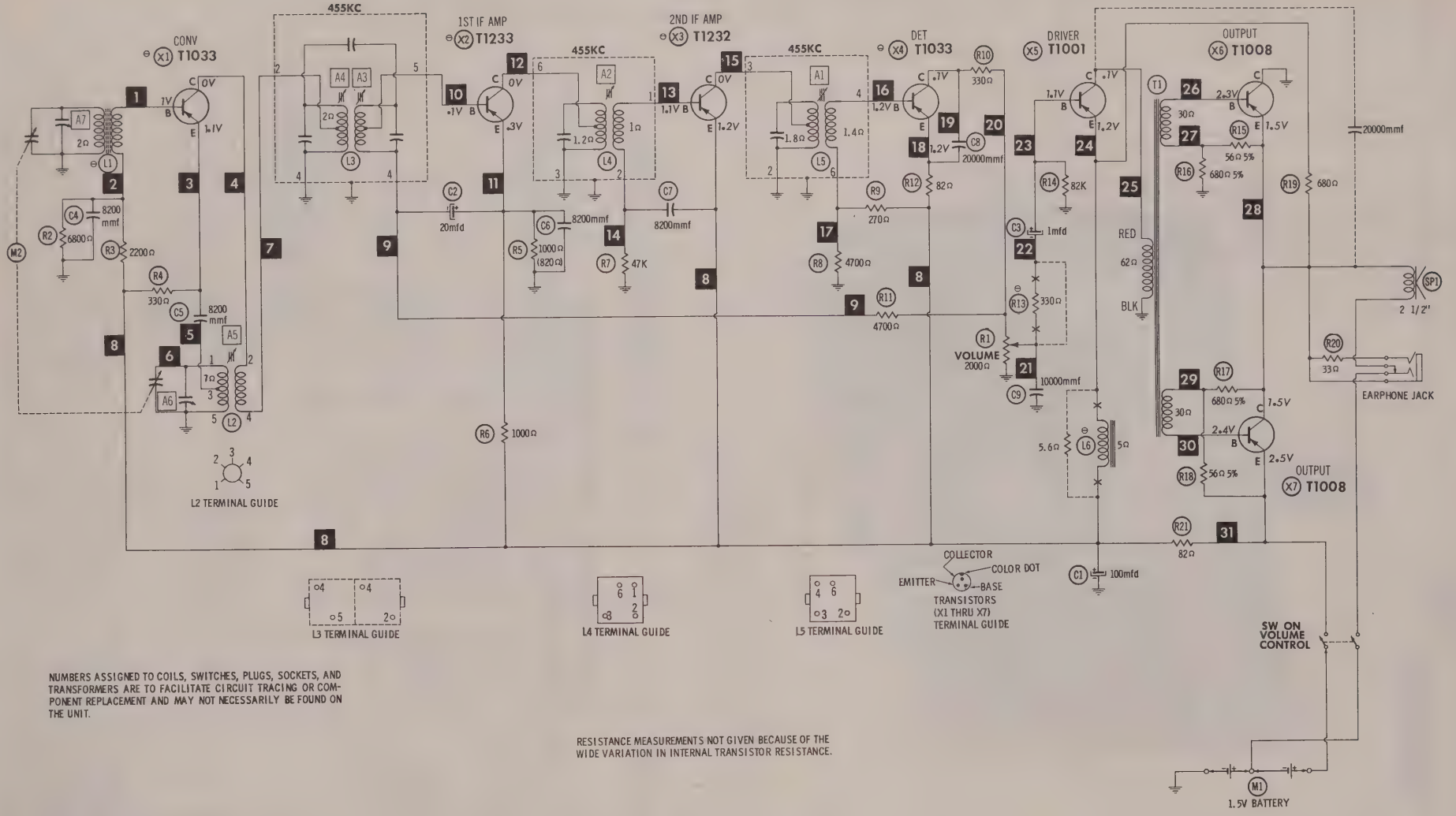
JF354

SET 465 FOLDER 11



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE'

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PHILCO MODELS T-7X (Code 128), T-75 (Code 124)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	T-1033 ①	Converter			2N486		PNP
X2	T-1233 ②	1st IF Amplifier			2N483		PNP
X3	T-1232 ③	2nd IF Amplifier			2N483		PNP
X4	T-1033 ④	Detector					PNP
X5	T-1001	Driver			2N362		PNP
X6	T-1008	Output			2N632		PNP } Matched Pair
X7	T-1008	Output			2N632		PNP }

① Alternate type T-1300. Replace with type shown.
② Alternate type T-1299. Replace with type shown.
③ Alternate type T-1298, T-1299 or T-1233. Replace with type shown.
④ Alternate type T-1300. Replace with type shown.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	PHILCO PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	100	3	30-2588-2	PWE3100	EC100-6	TT6X100	ML100-3	TE-1059.5	
C2	20	6	30-2588-1	PWE6020	EC20-6	TT15X20	ML20-6	TE-1090	
C3	1	5	30-2591-5	XPP-6001	EC1-6	TT12X1	ML1-6	TE-1080	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C4	8200		DAC-26	DD-822	HVE16D8	CCD-822	B-282	BL-D80
C5	8200		DAC-26	DD-822	HVE16D8	CCD-822	B-282	BL-D80
C6	8200		DAC-26	DD-822	HVE16D8	CCD-822	B-282	BL-D80
C7	8200		DAC-26	DD-822	HVE16D8	CCD-822	B-282	BL-D80
C8	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C9	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PHILCO PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	2000Ω	1/4	33-5583-3					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	6800Ω	
R3	2200Ω	
R4	330Ω	
R5	1000Ω	(820Ω)*
R6	1000Ω	
R7	47K	
R8	4700Ω	

ITEM No.	RATING	REMARKS
R9	270Ω	
R10	330Ω	
R11	4700Ω	
R12	82Ω	
R13	330Ω	Note 1
R14	82K	
R15	56Ω 5%	

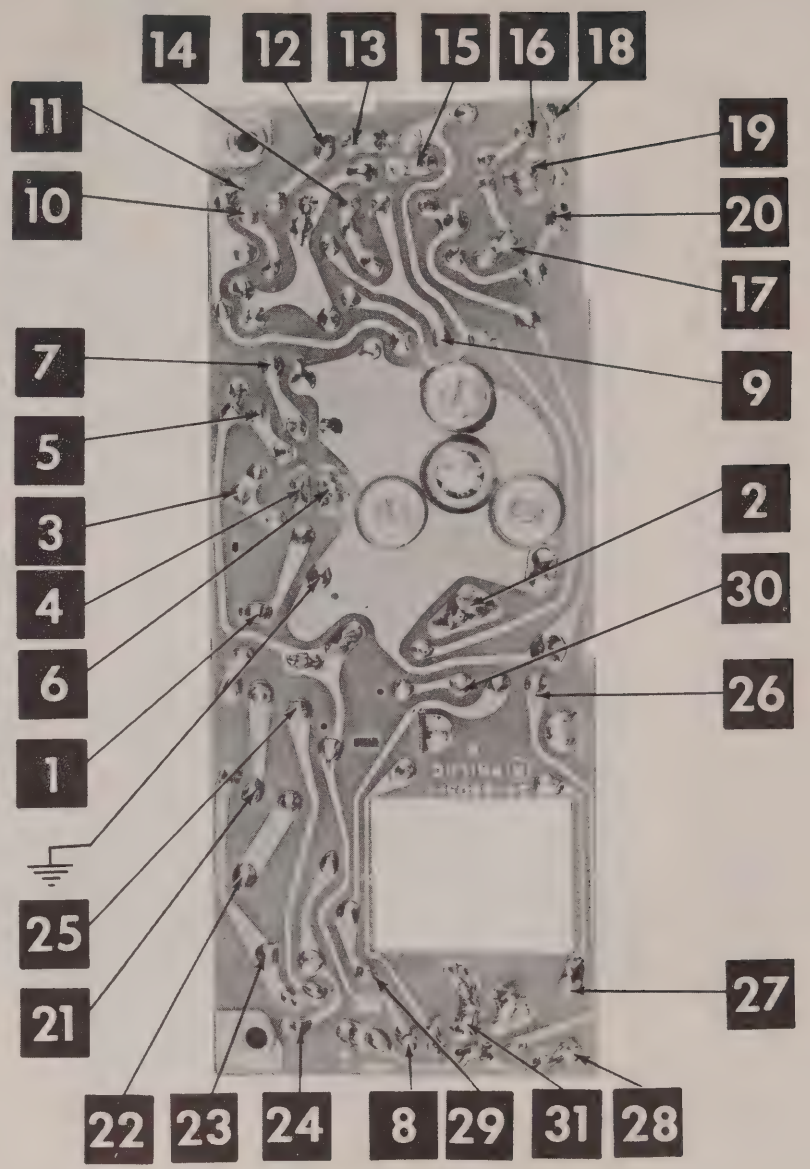
ITEM No.	RATING	REMARKS
R16	680Ω 5%	
R17	680Ω 5%	
R18	56Ω 5%	
R19	680Ω	
R20	33Ω	
R21	82Ω	

* Alternate.

Note 1. Not used in Model T-7X.

PRINTED BOARD

A Howard W. Sams CIRCUITRACE* Photo



PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		PHILCO PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	32-4668-7						①
L2	Osc. Coil	32-4669-4						
L3	1st IF Trans.	32-4708-9						
L4	2nd IF Trans.	32-4708-10						
L5	3rd IF Trans.	32-4708-11						
L6	Emitter Choke	32-4685-1	19-4400	19-4400	TV-202	6136		400uh ②

① Model T-7X, Code 128 uses Part #32-4688-4. ② Model T-7X, Code 128 uses 5.6Ω resistor in this application.

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC. 1	PHILCO PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	1.7	: 1 SEC. 2	32-8838-1						
	1.7	:1							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	PHILCO PART No.	QUAM PART No.	
SP1	2½"	PM	6-8Ω	36-1664-4		

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	1.5V	P-920		230		A100		M13R	Two Required.

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M2	Tuning Cap.	31-2782	2 Gang (Ant. 12-137mmf, Osc. 19-90mmf)
	Printed Board	54-6603-1	Model T-75
	Printed Board	54-6603	Model T-7X

CABINETS & CABINET PARTS

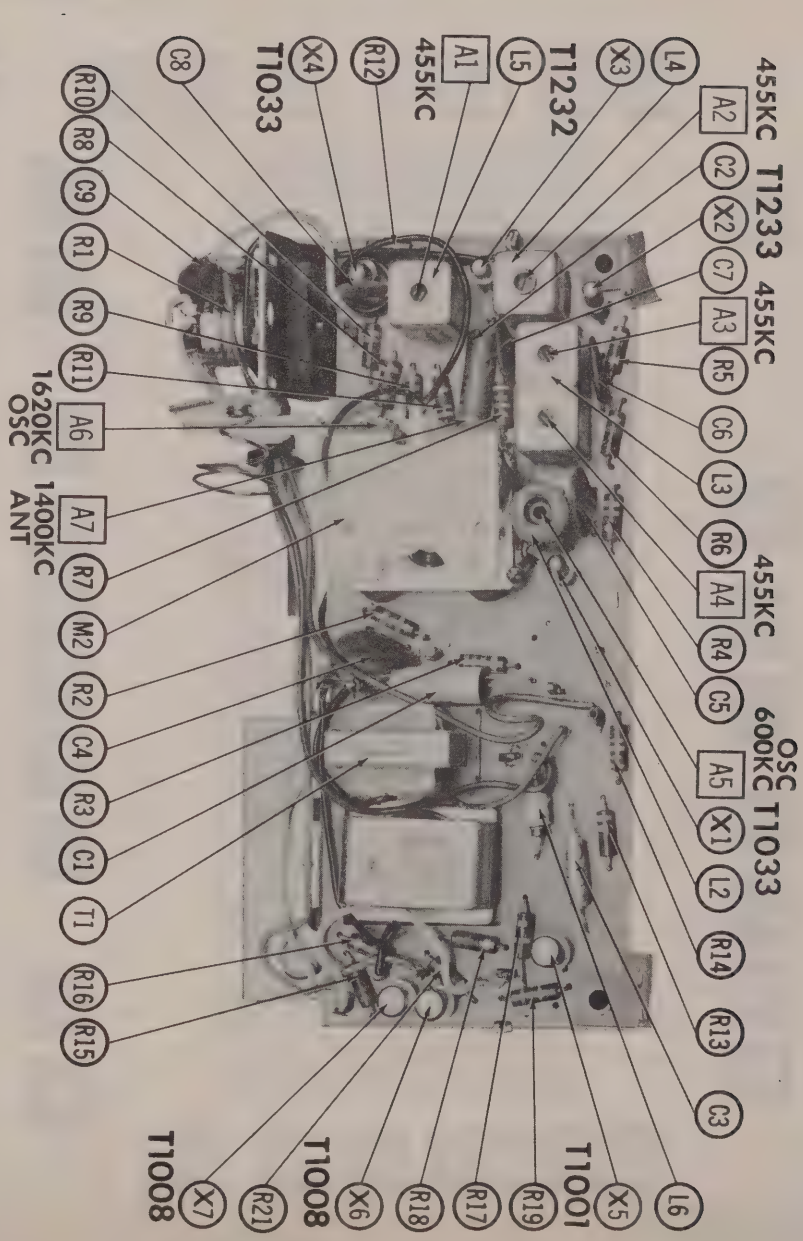
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	54-6858-1	Tuning, Model T-75
Knob	54-6257	Tuning, Model T-7X
Knob	54-6859-1	Volume, Model T-75
Knob	54-6256-1	Volume, Model T-7X
Cabinet	51-0045	Model T-75
Cabinet	1181-5	Model T-7X
Cabinet Front	28-12696	Model T-75
Bezel	28-11217	Model T-7X

WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

CHASSIS—TOP VIEW



PHOTOFACT* Folder

EIA

**PILOT MODEL
SM-245A**

PILOT MODEL
SM-245A

PILOT MODEL
SM-245A

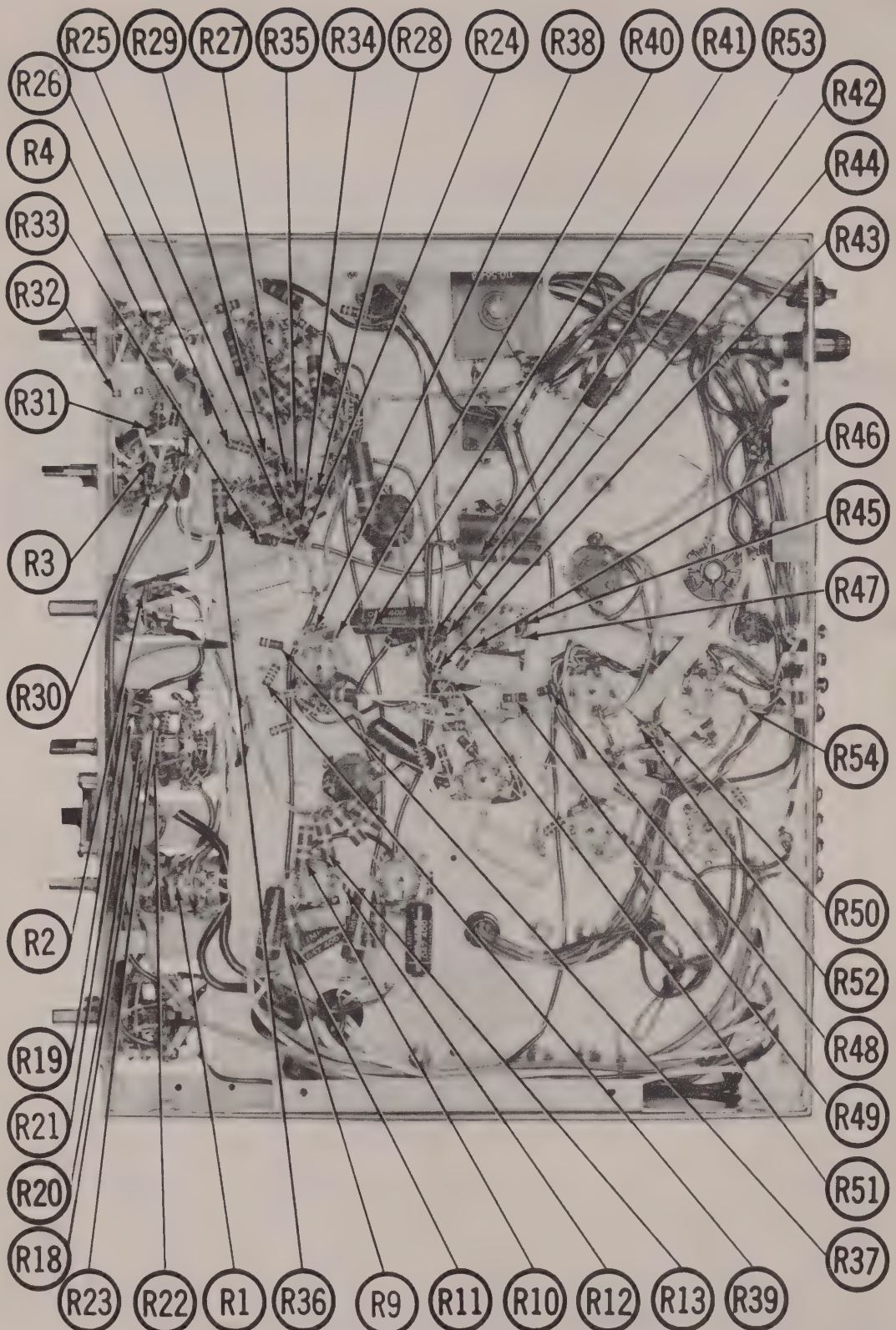
TRADE NAME	Pilot Model SM-245A
MANUFACTURER	Pilot Radio Corp., 37-06 36th Street, Long Island City 1, N. Y.
TYPE SET	AC Operated 12 Tube Stereo Amplifier
POWER SUPPLY	105-120 Volts AC, 60 Cycles RATING 120 Watts, 1.25 Amp. @ 117 Volts AC

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

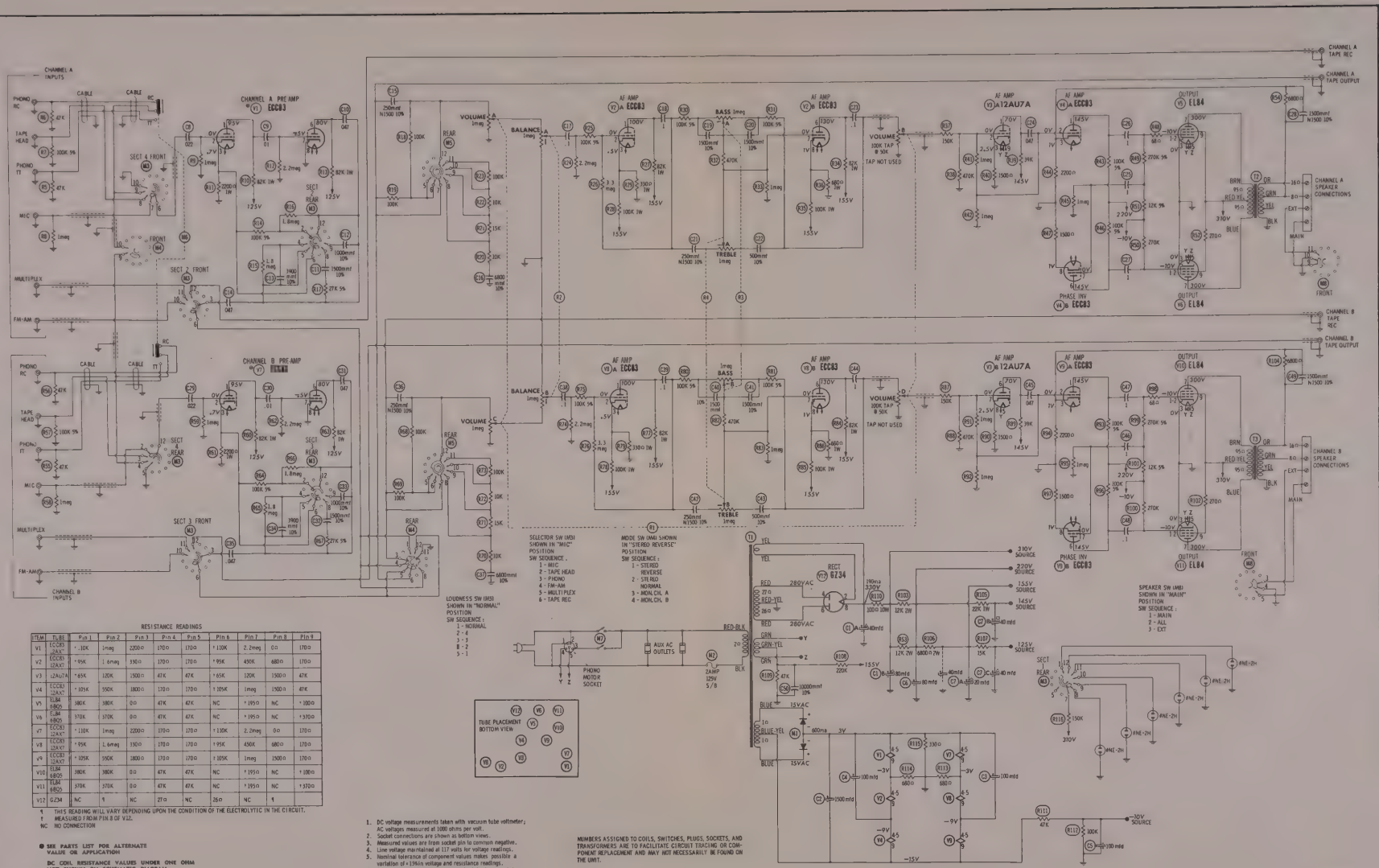
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JV392

DATE 11-59



CHASSIS BOTTOM VIEW - RESISTOR IDENT. (R1-R54)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	ECC83 12AX7	* 110K	1meg	2200Ω	170Ω	170Ω	* 110K	2.2meg	0Ω	170Ω
V2	ECC83 12AX7	* 95K	1.6meg	330Ω	170Ω	170Ω	* 95K	450K	680Ω	170Ω
V3	12AU7A	* 65K	120K	1500Ω	47K	47K	* 65K	120K	1500Ω	47K
V4	ECC83 12AX7	* 105K	550K	1800Ω	170Ω	170Ω	* 105K	1meg	1500Ω	47K
V5	EL84 6BQ5	380K	380K	0Ω	47K	47K	NC	* 195Ω	NC	* 100Ω
V6	EL84 6BQ5	370K	370K	0Ω	47K	47K	NC	* 195Ω	NC	* 370Ω
V7	ECC83 12AX7	* 110K	1meg	2200Ω	170Ω	170Ω	* 110K	2.2meg	0Ω	170Ω
V8	ECC83 12AX7	* 95K	1.6meg	330Ω	170Ω	170Ω	* 95K	450K	680Ω	170Ω
V9	ECC83 12AX7	* 105K	550K	1800Ω	170Ω	170Ω	* 105K	1meg	1500Ω	170Ω
V10	EL84 6BQ5	380K	380K	0Ω	47K	47K	NC	* 195Ω	NC	* 100Ω
V11	EL84 6BQ5	370K	370K	0Ω	47K	47K	NC	* 195Ω	NC	* 370Ω
V12	GZ34	NC	¶	NC	27Ω	NC	26Ω	NC	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V12.
NC NO CONNECTION

● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±10% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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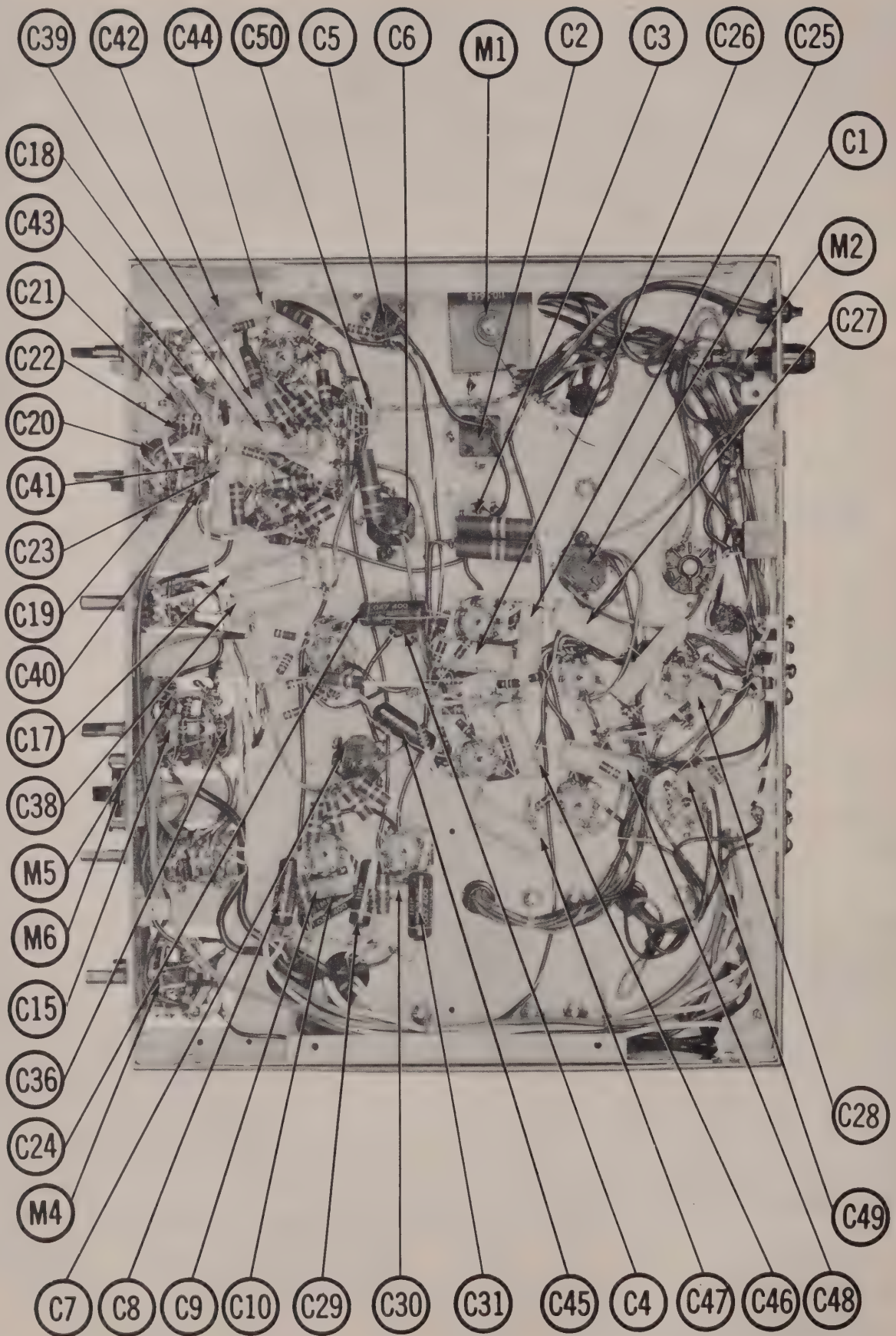
PILOT MODEL SM-245A



CHASSIS BOTTOM VIEW - CAPACITOR & MISC. IDENT.

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Channel A Pre Amplifier	ECC83/12AX7 (7025)*
V2	Channel A AF Amplifier	ECC83/12AX7
V3	Channel A AF Amplifier-Channel B AF Amplifier	12AU7A
V4	Channel A AF Amplifier-Channel A Phase Inverter	ECC83/12AX7
V5	Channel A Output	EL84/6BQ5
V6	Channel A Output	EL84/6BQ5
V7	Channel B Pre Amplifier	ECC83/12AX7 (7025)*
V8	Channel B AF Amplifier	ECC83/12AX7
V9	Channel B AF Amplifier-Channel B Phase Inverter	ECC83/12AX7
V10	Channel B Output	EL84/6BQ5
V11	Channel B Output	EL84/6BQ5
V12	Rectifier	GZ34

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA PILOT PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	400	24-124		C0230	FP149	TMS-52	TVL-4739	
B	▲80	400				TC78	TD-40-450		
C2	1500	25	24-163	AFH1-10	A0130	WP059	TMS-11	TVLS-1240 *	
						TC2505	TD-500-25		
C3	100	25	24-154	AFH1-21	XA0241	WP055	TMS-9	TVL-1423	
C4	100	25	24-154	AFH1-21	XA0241	WP055	TMS-9	TVL-1423	
C5	100	25	24-154	AFH1-21	XA0241	WP055	TMS-9	TVL-1423	
C6	80	350	24-177	AFH1-42	A0400	FP138	TMS-47	TVL-1630	
C7A	▲20	350	24-174	AFH3-43-50	D0430	FP376.9	TMT-39	TVL-3786	
B	■40	350							
C	▲40	350							

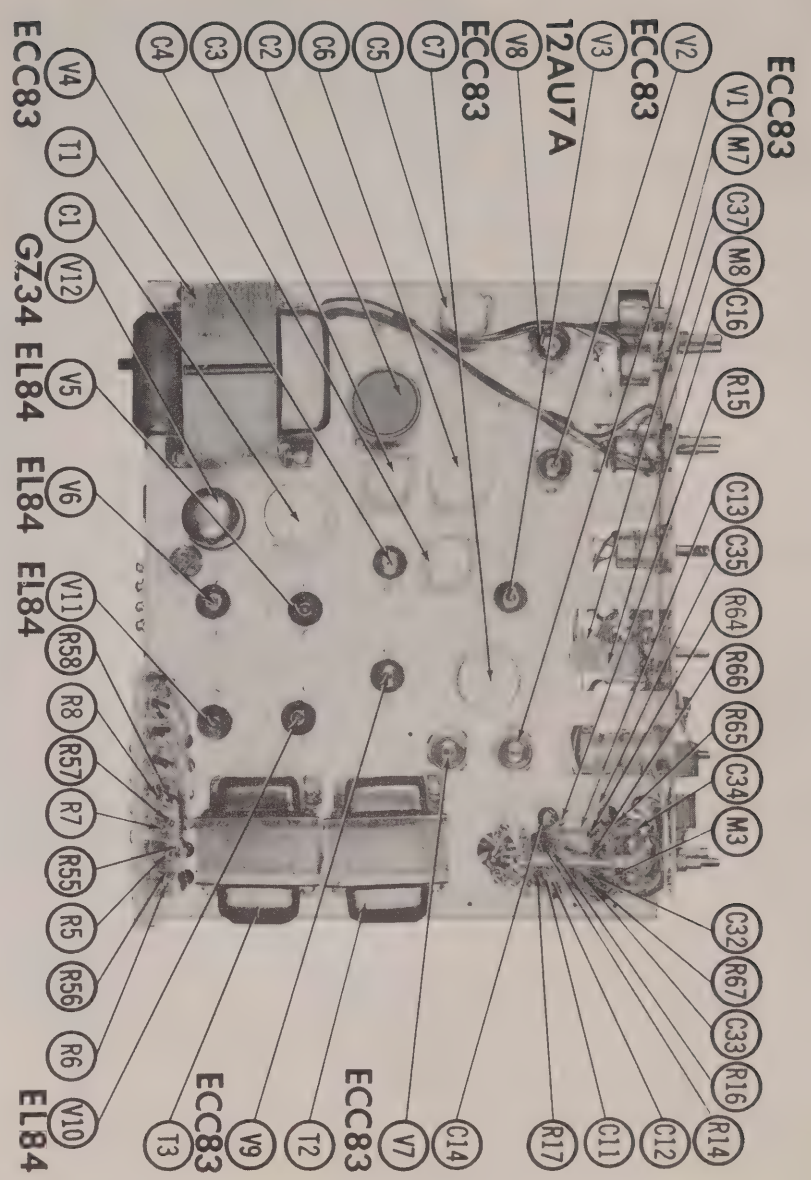
* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C8	.022 400V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C9	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C10	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C11	1500 10%		DI-1500		PM6D15	CCS-152	JL-215	6TM-D15
C12	1000 10%		DI-1000		PM6D1	CCS-102	JL-210	6TM-D1
C13	3900 10%		DI-3900		PM6D4	CCS-392	JL-239	6TM-D4
C14	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473 *	GEM-4147	4TM-S47
C15	250 N1500 10%				PM6D68	6DP-1-682	GEM-6268	6TM-D68
C16	6800 10%							
C17	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C18	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C19	1500 10%		DI-1500		PM6D15	CCS-152	JL-215	6TM-D15
C20	1500 10%		DI-1500		PM6D15	CCS-152 *	JL-215	6TM-D15
C21	250 N1500 10%							
C22	500 10%		DI-500	DD-501	5R5T5	CCS-501	GP-350	10TS-T50
C23	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C24	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C25	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C26	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C27	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C28	1500 N1500 10%							
C29	.022 400V		P488N-022		CUB4S22	4DP-2-223	GEM-4122	4TM-S22
C30	.01 400V		P488N-01	D6-103	CUB4S1	4DP-1-103	GEM-411	4TM-S1
C31	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C32	1500 10%		DI-1500		PM6D15	CCS-152	JL-215	6TM-D15
C33	1000 10%		DI-1000		PM6D1	CCS-102	JL-210	6TM-D1
C34	3900 10%		DI-3900		PM6D4	CCS-392	JL-239	6TM-D4
C35	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473 *	GEM-4147	4TM-S47
C36	250 N1500 10%				PM6D68	6DP-1-682	GTM-6268	6TM-D68
C37	6800 10%							
C38	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C39	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C40	1500 10%		DI-1500		PM6D15	CCS-152	JL-215	6TM-D15
C41	1500 10%		DI-1500		PM6D15	CCS-152	JL-215	6TM-D15

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

FIXED CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C42	250 N1500 10%					*		
C43	500 10%		DI-500	DD-501	5R5T5	CCS-501	GP-350	10TS-T10
C44	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C45	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C46	.1 200V		P288N-1	DF-104	CUB2P1	2DP-3-104	GEM-201	2TM-P1
C47	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C48	.1 400V		P488N-1	DF-104	CUB4P1	4DP-3-104	GEM-401	4TM-P1
C49	1500 N1500 10%							
C50	10000 10%		DI-10000		PM6S1	6DP-2-103	GP-110	10TS-S10

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PILOT PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1meg	1/2	36-71			Q11-137		Volume, Channel A
B	100K *	1/2				M11-128		Volume, Channel A
C	1meg	1/2				M11-137		Volume, Channel B
D	100K *	1/2				M11-128		Volume, Channel B
R2A	1meg	1/2	39-57				■ UE-4008	Balance, Channel A
B	1meg	1/2						Balance, Channel B
R3A	1meg	1/2	37-40	F1-41		▲ QJ-1117R	▲ UE4044	Bass, Channel A
B	1meg	1/2		R2-51				Bass, Channel B
R4A	1meg	1/2	37-40	F1-51		▲ QJ-1117R	▲ UE4044	Treble, Channel A
B	1meg	1/2		R2-51				Treble, Channel B

* Tap ⓐ 50K (Not used).
■ "STA-LOC" Equivalent: FA16A, RU16R, CS3500.
▲ "STA-LOC" Equivalent: FA16L, RU16L, OS812, IK1312.
▲ "Concentrikit" Equivalent: K-2 Kit with Base Elements & Shafts: B11-137, P1-028 (Panel)
B11-137, R1-111 (Rear)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R5	47K	
R6	47K	
R7	100K 5%	
R8	1meg	
R9	1meg	
R10	82K 1W	
R11	2200Ω 1W	
R12	2.2meg	
R13	82K 1W	
R14	100K 5%	
R15	1.8meg	
R16	1.8meg	
R17	27K 5%	
R18	100K	
R19	100K	
R20	10K	
R21	15K	
R22	10K	
R23	100K	
R24	2.2meg	
R25	100K 5%	
R26	3.3meg	
R27	82K 1W	
R28	100K 1W	
R29	330Ω 1W	
R30	100K 5%	
R31	100K 5%	
R32	470K	

ITEM No.	RATING	REMARKS
R33	1meg	
R34	82K 1W	
R35	100K 1W	
R36	680Ω 1W	
R37	150K	
R38	470K	
R39	39K	
R40	1500Ω	
R41	1meg	
R42	1meg	
R43	100K 5%	
R44	2200Ω	
R45	1meg	
R46	100K 5%	
R47	1500Ω	
R48	68Ω	
R49	270K 5%	
R50	270K	
R51	12K 5%	
R52	270Ω	
R53	12K 2W	
R54	6800Ω	
R55	47K	
R56	47K	
R57	100K 5%	
R58	1meg	
R59	1meg	
R60	82K 1W	

ITEM No.	RATING	REMARKS
R61	2200Ω 1W	
R62	2.2meg	
R63	82K 1W	
R64	100K 5%	
R65	1.8meg	
R66	1.8meg	
R67	27K 5%	
R68	100K	
R69	100K	
R70	10K	
R71	15K	
R72	10K	
R73	100K	
R74	2.2meg	
R75	100K 5%	
R76	3.3meg	
R77	82K 1W	
R78	100K 1W	
R79	330Ω 1W	
R80	100K 5%	
R81	100K 5%	
R82	470K	
R83	1meg	
R84	82K 1W	
R85	100K 1W	
R86	680Ω 1W	
R87	150K	
R88	470K	

RESISTORS (cont)

ITEM No.	RATING	REMARKS
R89	39K	
R90	1500Ω	
R91	1meg	
R92	1meg	
R93	100K 5%	
R94	2200Ω	
R95	1meg	
R96	100K 5%	
R97	1500Ω	
R98	68Ω	

ITEM No.	RATING	REMARKS
R99	270K 5%	
R100	270K	
R101	12K 5%	
R102	270Ω	
R103	12K 2W	
R104	6800Ω	
R105	22K 1W	
R106	6800Ω 2W	
R107	15K	

ITEM No.	RATING	REMARKS
R108	220K	
R109	47K	
R110	100Ω 10W	
R111	47K	
R112	100K	
R113	680Ω	
R114	680Ω	
R115	330Ω	
R116	150K	

TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	PILOT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ 1.25A	560VCT ⓐ .190A	5V ⓐ 1.9A	55-63						
	SEC. 3	SEC. 4	SEC. 5							
	6.3VCT ⓐ 3.4A	30VCT ⓐ .6A								

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	PILOT PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7300Ω CT	16Ω Taps ⓐ 8Ω, 4Ω	56-51	22S66 ①	A-3128 ①		A-3304 ①	22S66 ①	S-24A ①	① Drill new mounting holes.
T3	7300Ω CT	16Ω Taps ⓐ 8Ω, 4Ω	56-55	22S66 ①	A-3128 ①		A-3304 ①	22S66 ①	S-24A ①	

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	PILOT PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.605A	110-564B ①			4N33-1CN1-RV ①		① Selenium Type

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			PILOT PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	2A 125V S/B	111-16		312002 (3AG 2A 125V S/B)	342001	MDL2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	PILOT PART No.	NOTES
M3	Switch	100-136	Function
M4	Switch	100-148	Mode
M5	Switch	100-141	Loudness
M6	Switch	100-26	Dual Channel Cartridge Selector (DPDT Slide Type)
M7	Switch	100-142	Power Off-On, Auto. Shut Off
M8	Switch	100-146	Speaker Selector

PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

PRECISION MODEL 20PA

PRECISION MODEL 20PA

PRECISION MODEL 20PA

TRADE NAME	Precision Model 20PA
MANUFACTURER	Precision Electronics, Inc., 9101 King Street, Franklin Park, Illinois
TYPE SET	AC Operated 5 Tube Audio Amplifier
POWER SUPPLY	110 -120 Volts AC, 60 Cycles RATING 62 Watts, .64 Amp. @117 Volts AC

SOME VERSIONS MAY HAVE A MANUAL RECORD PLAYER MOUNTED ON THE TOP OF THE AMPLIFIER CASE

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of HX991R

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PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆ GENERAL ELECTRIC ◆ RAYTHEON ◆ SYLVANIA ◆					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	Mic Preamp. - AF Amp.	12AX7	V4	Output	6V6GT
V2	AF Amp. - Phase Inv.	12AX7	V5	Rectifier	6X5GT (6AX5GT)*
V3	Output	6V6GT			

* Alternate

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	PRECISION PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	400		AFH4-117-48	D0640	FP429	TMT-157	TVLS-4657.6*	
B	■30	350					TD-40-450		
C	▲10	300							
D	20	25							
C2	10	250		PRS350V10	BR1045	TC52	TD-10-250	TVA-1504	

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C4	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C6	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S1
C7	470 10%		DI 470	MD-471		CCD-471	JL-347	5GA-T47
C8	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C9	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	PRECISION PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Microphone
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R2A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Phono
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R3A	2meg	½	LFBC2M	B-76	A47-2meg-Z	Q13-139	U55	Bass
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	
R4A	500K	½	GVC-500K	B-60	A47-500K-Z	Q13-133	U48	Treble
B	Shaft			Not Req.	RS-2	Not Req.	Not Req.	

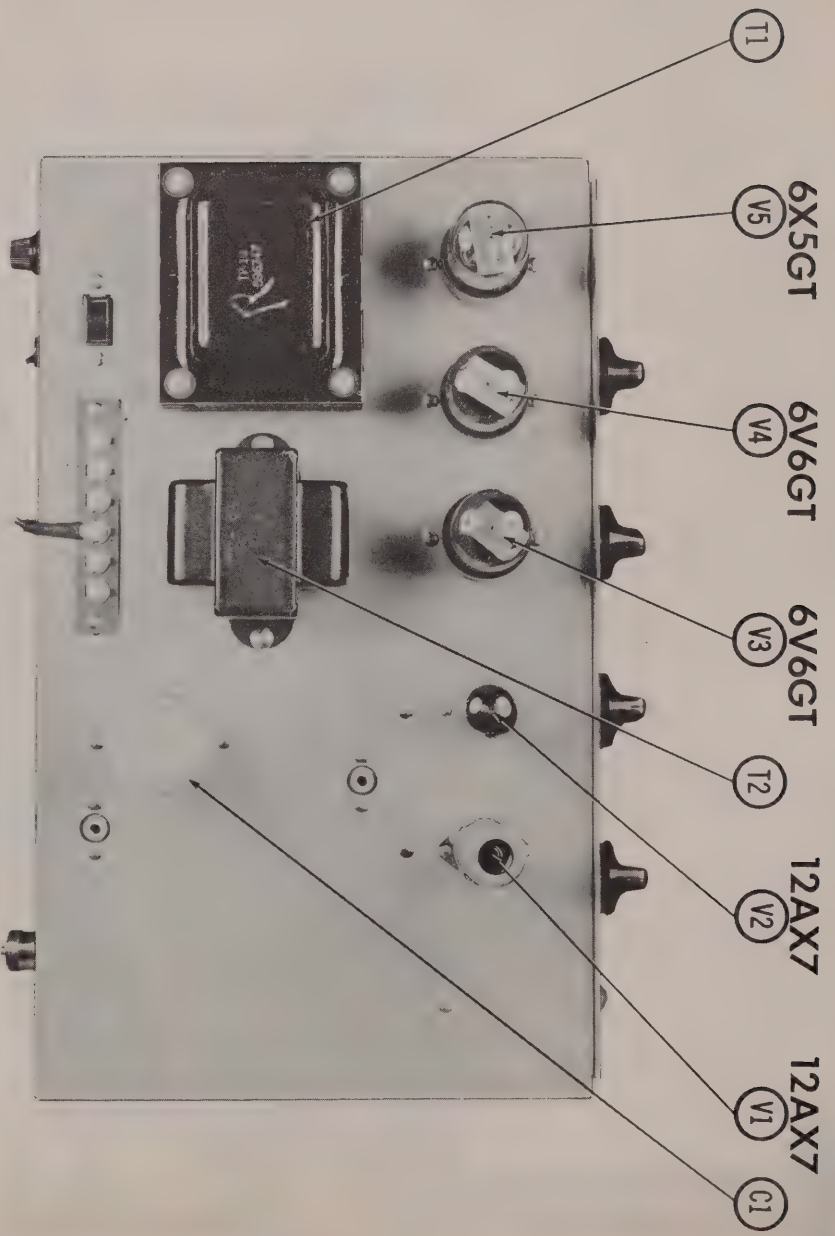
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		PRECISION PART No.	NOTES
	OHMS	WATT		
R5	3.3meg			
R6	100K			
R7	220K			
R8	220K			

ITEM No.	RATING		PRECISION PART No.	NOTES
	OHMS	WATT		
R9	100K			
R10	1000Ω			
R11	1meg			
R12	220K			

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (cont)

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	PRECISION PART No.	NOTES
R13	100K			
R14	100K 5%			
R15	1000Ω			
R16	120K			
R17	3900Ω			

ITEM No.	RATING OHMS	RATING WATT	PRECISION PART No.	NOTES
R18	120K			
R19	5600Ω	2		
R20	300Ω	7		
R21	1000Ω			
R22	22K			

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	REPLACEMENT DATA PRECISION PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .64A	680 VCT @ .085A	6.3 VCT @ 3.3A	TP-10	24R04	P-2952		PM8409	24R04	R-11B

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA PRECISION PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T2	6000Ω CT	330Ω (70V) Tap @ 16Ω 8Ω, 4Ω	T018A							

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA PRECISION PART No. FUSE	PRECISION PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG	2A 250V			312002. (3AG 2A 250V)	342001	AGC 2	HKP

MISCELLANEOUS

ITEM No.	PART NAME	PRECISION PART No.	NOTES
M2	Lamp		#51 Not used in some versions
M3	Switch		Power On-Off (Slide Type)

CABINETS & CABINET PARTS

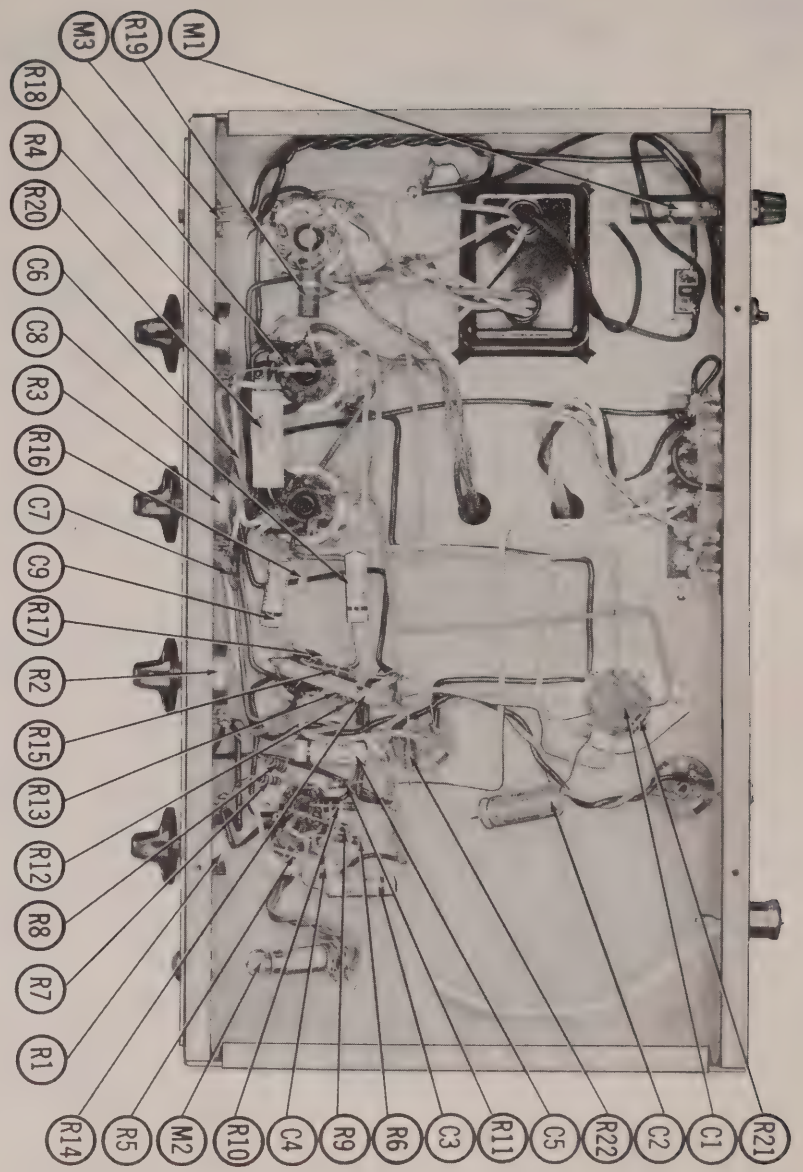
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

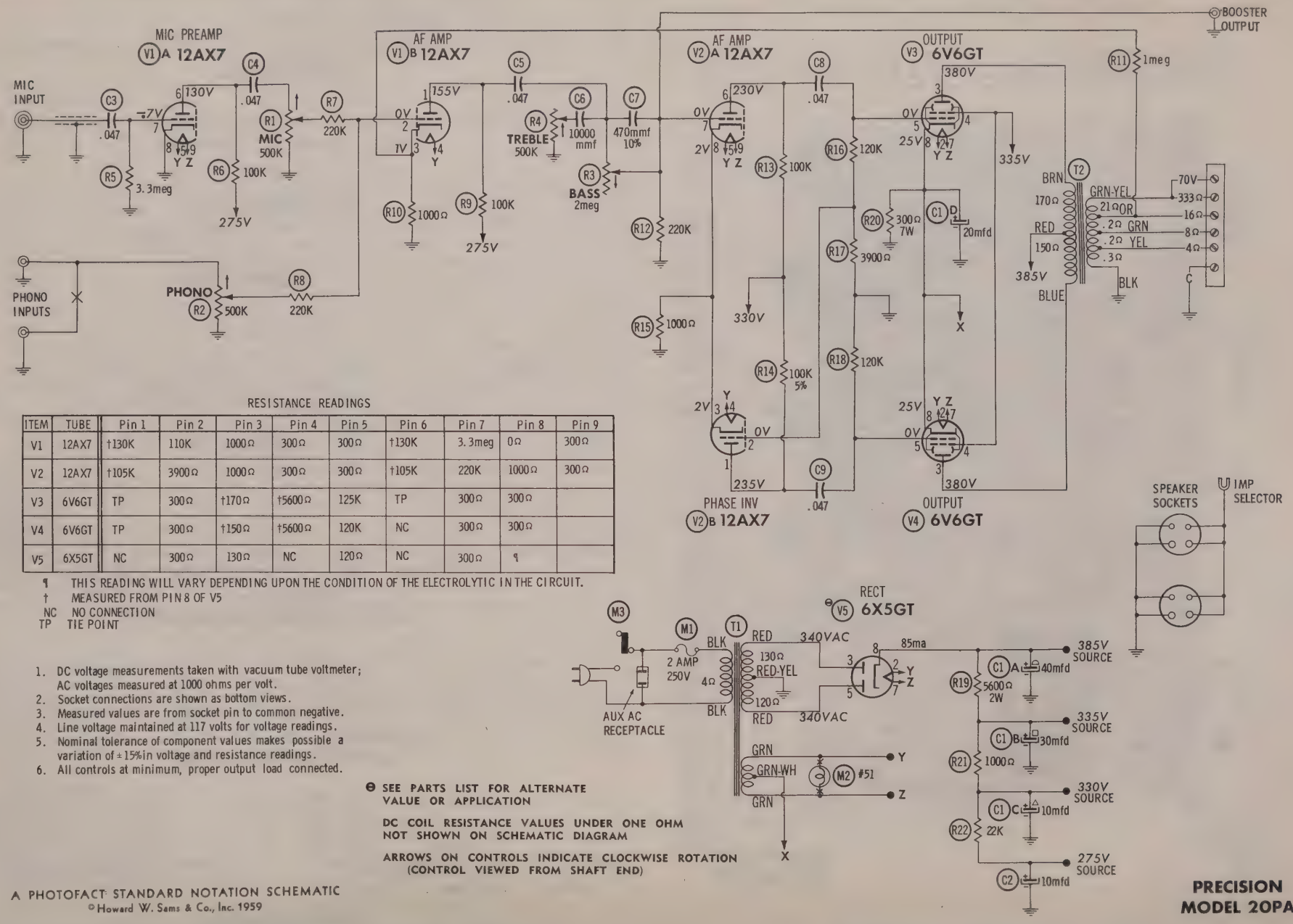
WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

CHASSIS—BOTTOM VIEW





RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†130K	110K	1000Ω	300Ω	300Ω	†130K	3.3meg	0Ω	300Ω
V2	12AX7	†105K	3900Ω	1000Ω	300Ω	300Ω	†105K	220K	1000Ω	300Ω
V3	6V6GT	TP	300Ω	†170Ω	†5600Ω	125K	TP	300Ω	300Ω	
V4	6V6GT	TP	300Ω	†150Ω	†5600Ω	120K	NC	300Ω	300Ω	
V5	6X5GT	NC	300Ω	130Ω	NC	120Ω	NC	300Ω	¶	

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 8 OF V5
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

Θ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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PRECISION MODEL 20PA

PHOTOFACT* Folder with CIRCUITRACE*

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

RCA VICTOR MODELS C1D, E, F, L, C2E, FE, J, C3E, EK, HE, PC1, X1, X2EF, HE, JE, X3EM, EN, HE (Ch. RC-1188, A, B, C, D)

RCA VICTOR MODELS C1D, E, F, L, C2E, FE, J, C3E, EK, HE, PC1, X1, X2EF, HE, JE, X3EM, EN, HE (Ch. RC-1188, A, B, C, D)

MODEL C1E

TRADE NAME	RCA Victor Models C1D, E, F, L (CH. RC-1188A); C2E, FE, J (CH. RC-1188B); C3E, EK, HE(CH. RC-1188D) PC-1 (CH. RC-1188A); X1, X2EF, HE, JE (RC-1188); X3EM, EN, HE (CH. RC-1188C)
MANUFACTURER	RCA Victor Radio & "Victrola" Div., Radio Corp. of America, Camden 8, N. J.
TYPE SET	AC Operated 5 Tube AM Receiver With Electric Clock (X Series Do Not Have Clock)
POWER SUPPLY	110-120 Volts AC, 60 Cycles RATING 26 Watts, .28 Amp. @117 Volts AC (Less Clock)
TUNING RANGE—BROADCAST	535 — 1620KC

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1mfd capacitor in series with low side of signal generator. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

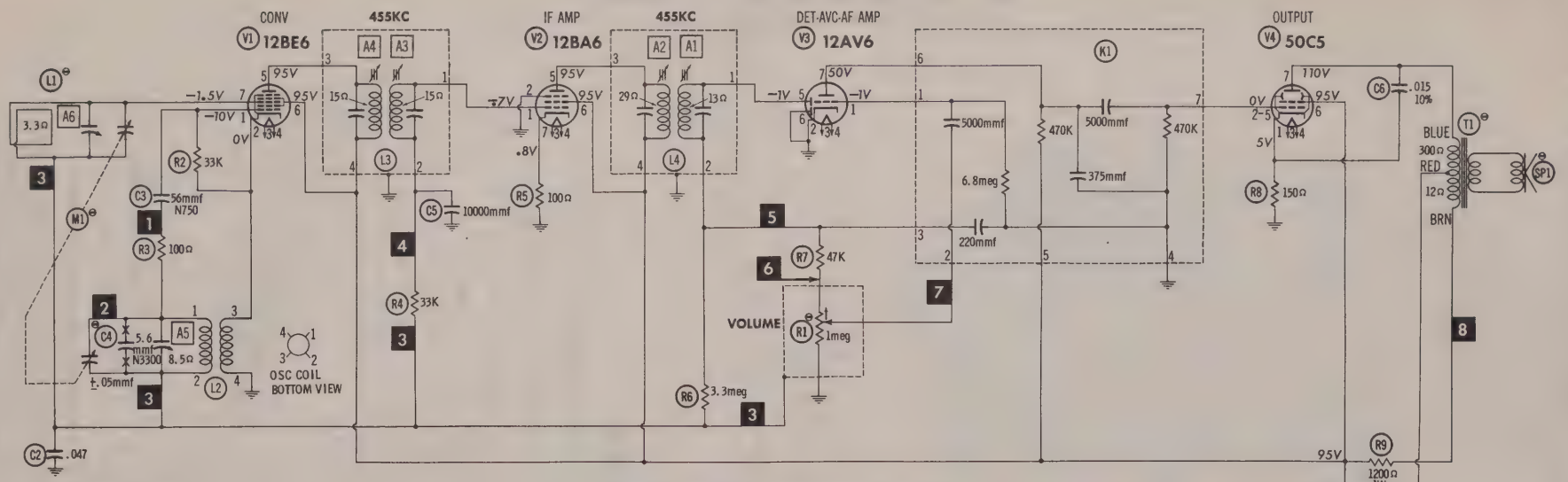
Suggested Alignment Tools:
A1, A2, A3..... GENERAL CEMENT #8282, 8606, 8606L, 9091
WALSCO #2526, 2541, 2543, 2544
A6..... GENERAL CEMENT #8606, 8606L, 8282, 9295
WALSCO #2526, 2543, 2544, 2545

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01mfd	High side to antenna stator lug of tuning gang. Low side to B-.	455KC (400∿ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum output.
2.		Loop	1620KC	"	"	A4	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	Tune to 1400KC signal	"	A5	"
4.		"	600KC	Tune to 600KC signal	"	A6	Adjust for maximum output while rocking tuning gang. Repeat Steps 2, 3 & 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JG361



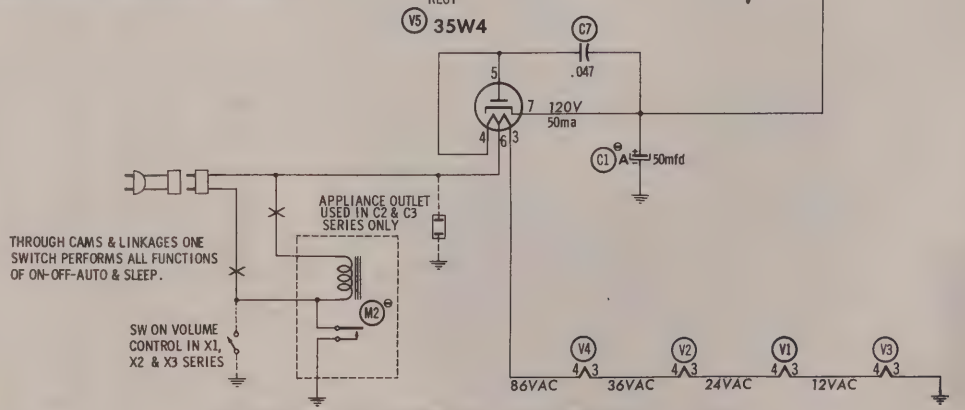
RESISTANCE READINGS

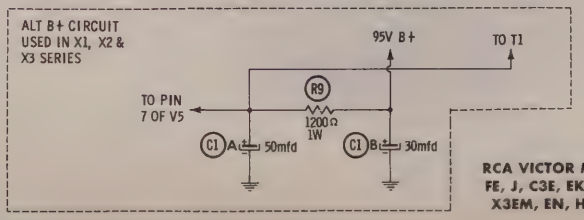
ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	12BE6	33K	1Ω	12Ω	24Ω	†1200Ω	†1200Ω	4.3meg
V2	12BA6	4.3meg	0Ω	24Ω	36Ω	†1200Ω	†1200Ω	100Ω
V3	12AV6	6.8meg	0Ω	0Ω	12Ω	1meg	0Ω	†470K
V4	50C5	150Ω	470K	36Ω	86Ω	470K	†1200Ω	†300Ω
V5	35W4	TP	TP	86Ω	120Ω	120Ω	110Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V5.
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.





⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC
with CIRCUITRACE®

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RCA VICTOR MODELS C1D, E, F, L, C2E, FE, J, C3E, EK, HE, PC1, X1, X2EF, HE, JE, X3EM, EN, HE (Ch. RC-1188, A, B, C, D)

PARTS LIST AND DESCRIPTIONS

TUBES

◆ CBS ◆		GENERAL ELECTRIC ◆		RAYTHEON ◆		SYLVANIA ◆	
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE		
V1	Converter	12BE6	V4	Output	50C5		
V2	IF Amplifier	12BA6	V5	Rectifier	35W4		
V3	Det. -AVC-AF Amp.	12AV6					

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	RCA Victor PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	50 30	150 150	106987	PRS150V5030	BBRD5315	WD210	TDLD-8	TVA-2450	Note 1 Note 1

Note 1. Chassis RC-1188D use 50-50mfd@150V (Part #108260) in this application.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C3	56 N750			TCN-56	C10Q56U	CCTN-560	CN7-456	10TCU-Q56
C4	5.6 N3300 ±.5mmf	#103440①						
C5	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S1
C6	.015 400V 10%		V84C4S15 10%		PM4S15	4DP-1-153	GTM-4115	4TM-S15
C7	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47

① Not used in Chassis RC-1188, C.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA Victor PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	1meg	½	106988					Volume - Note 1

Note 1. Chassis RC-1188 uses 1meg Volume with switch, Part #108009.
Chassis RC-1188C uses 1meg Volume with switch, Part #108248.
Chassis RC-1188B, D uses 1meg Volume, Part #108223.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	33K	
R3	100Ω	
R4	33K	

ITEM No.	RATING	REMARKS
R5	100Ω	
R6	3.3meg	
R7	47K	

ITEM No.	RATING	REMARKS
R8	150Ω	
R9	1200Ω 1W	

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	RCA Victor PART No.	REPLACEMENT DATA
K1	Audio Coupling	220mmf, 375mmf, 5000mmf, 5000mmf, 470K, 470K, 6.8meg	106989	

COILS (RF-IF)

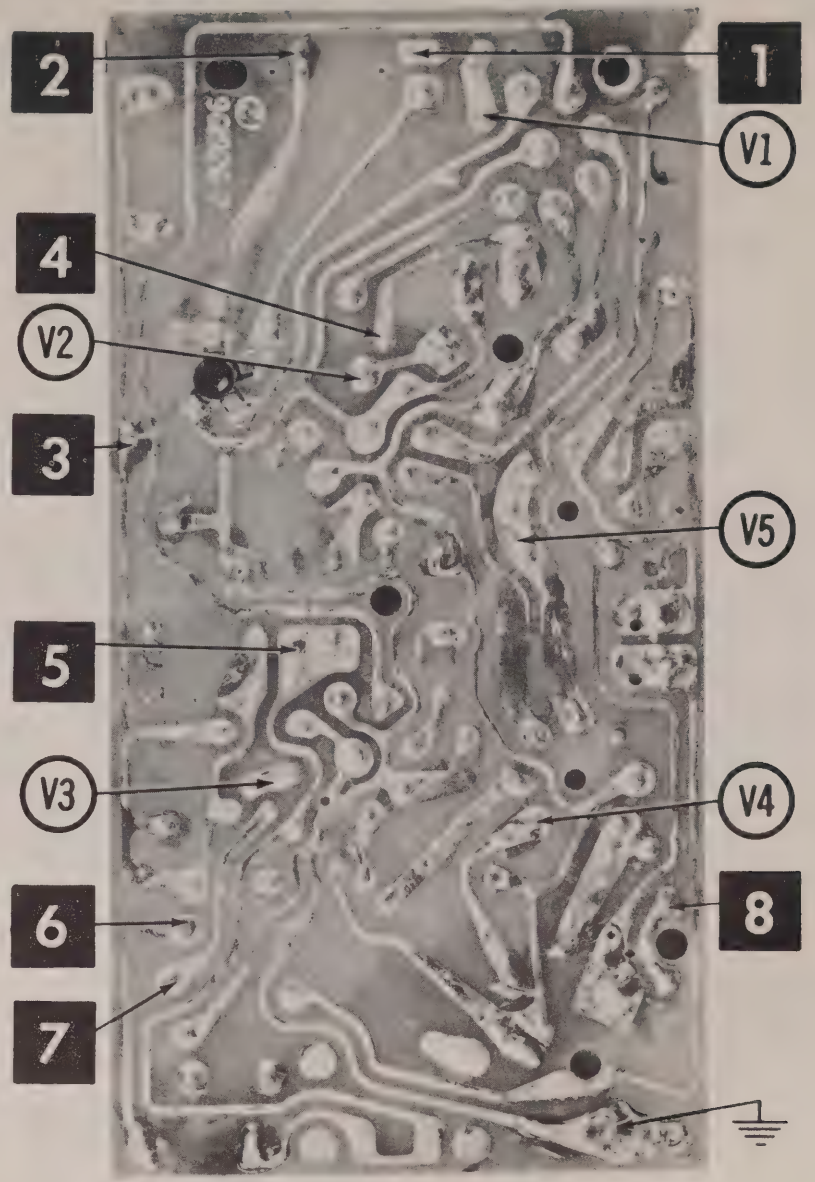
ITEM No.	USE	REPLACEMENT DATA						NOTES
		RCA Victor PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loop Ant.	103606						①
L2	Osc. Coil	103204						
L3	Input IF	108007	16-6780	16-6780	BC-356	13-PC1	RF-4	
L4	Output IF	108008	16-6780	16-6780	BC-357	13-PC2	RF-4	

① Chassis RC-1188 uses Part #107158. Chassis RC-1188B, D use Part #108265.
Chassis RC-1188C uses Part #108295.

PRINTED BOARD

A Howard W. Sams CIRCUITRACE® Photo

ARROWS INDICATING TUBE LOCATIONS ARE POINTING TO PIN 1 UNLESS OTHERWISE INDICATED



RCA VICTOR MODELS CID, E, F, L, C2E, FE, J, C3E, EK, HE, PC1, X1, X2EF, HE, JE, X3EM, EN, HE (Ch. RC-1188, A, B, C, D)

FOLDER 14

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	RCA Victor PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2400Ω Tap ⓐ 3%	3-4Ω	79283 ①							

① Chassis RC-1188C uses Part #100661.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	103669 ①	4A07 *	* Cut Off Corner To Match Original
	4"	PM	3-4Ω	104099 ②	4A07	
	3½"	PM		108251 ③		

① C1 Series, C2 Series, C3 Series, PC1, X3 Series
② X1, X2 Series
③ X3 Series

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M1	Tuning Cap	103209	2 Gang, Chassis RC1188A, Ant. 11. 2-329. 5mmf
	Tuning Cap	107162	2 Gang Chassis RC1188, C Ant. 914-308. 9mmf, Osc. 7. 2-114mmf
	Tuning Cap	108219	2 Gang Chassis RC1188, B, D Ant. 9. 4-308. 9mmf-Osc. 7. 2-114 mmf
M2	Clock		Chassis RC-1188A, B, D
	Printed Board	107012	

CABINETS & CABINET PARTS

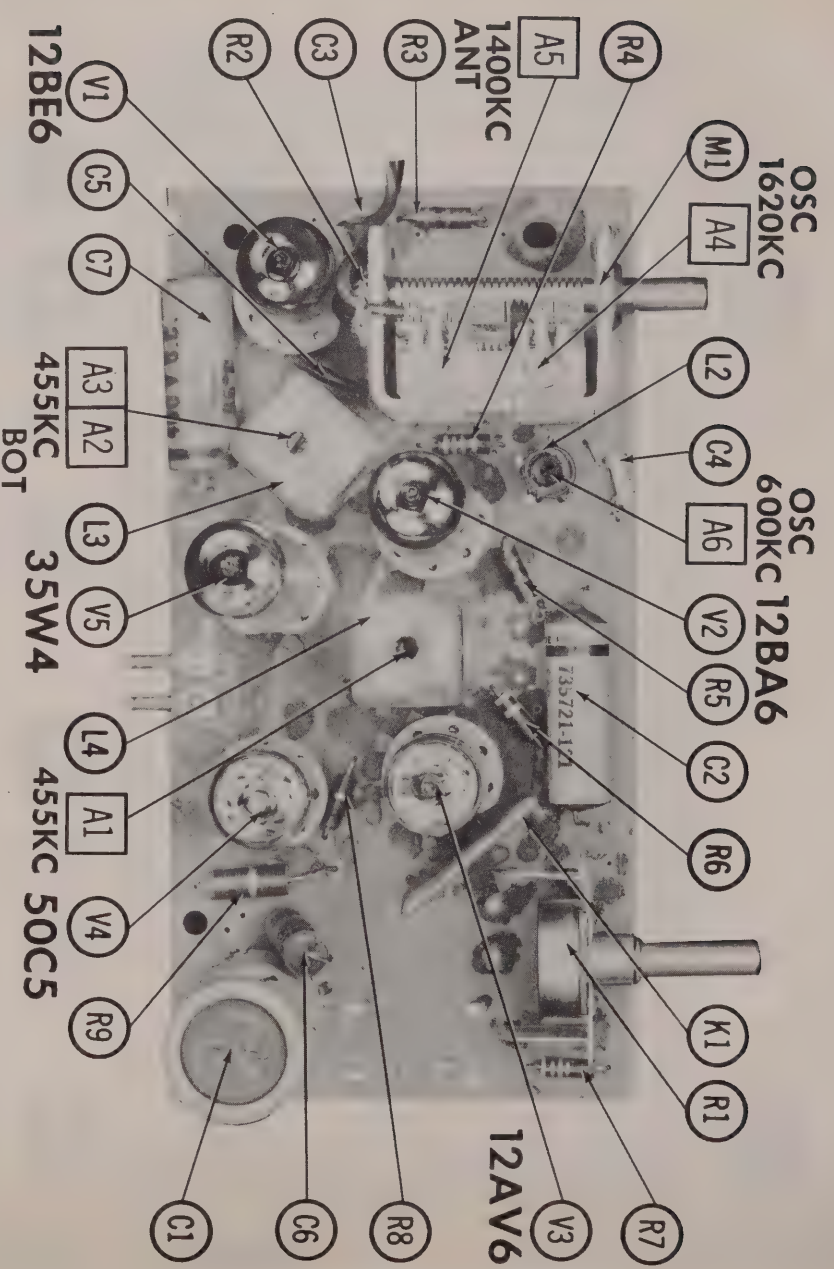
(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	106994	Tuning, Volume Models C1 Series, & PC-1
Knob	107160	Tuning, Volume Models X1 & X2 Series
Knob	108216	Tuning, Models C-2E & C-2FE
Knob	108222	Tuning, Model C-2J
Knob	108238	Tuning, Model C-3 Series
Knob	108249	Tuning, Model X-3 Series
Knob	108250	Volume, Model X-3 Series
Knob	108220	Volume, C-2 & C-3 Series
Knob	106995	Clock Timer, Function Models C-1 Series, P-C1
Knob	106996	Time Set Models C-1, & PC-1
Knob	108218	Time Set Models C-2,&C-3 Series
Dial	107156	Tuning, Models X-1 Series
Dial	107157	Tuning, Models X-2 Series
Dial	108292	Tuning, Models X-3 Series
Cabinet	Y7033	Model C-1E
Cabinet	Y7049	Model C-1D
Cabinet	Y7050	Model C-1F
Cabinet	Y7051	Model C-1L
Cabinet	Y7042	Model X2HE
Cabinet	Y7041	Model X2EF
Cabinet	Y7043	Model X2JE
Cabinet	Y7040	Model X1
Cabinet	Y7067	Model X3EK
Cabinet	Y7068	Model X3EN
Cabinet	Y7069	Model X3HE
Cabinet	Y7071	Model PC-1
Cabinet	Y7055	Model C-2E
Cabinet	Y7056	Model C-2FE
Cabinet	Y7057	Model C-2J
Cabinet	Y7061	Model C-3E
Cabinet	Y7062	Model C-3EK
Cabinet	Y7063	Model C-3HE

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors
Power Cord (Interlock Type) ..... Use BELDEN No. 8874

CHASSIS—TOP VIEW



PHOTOFACT* Folder

EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

SILVERTONE MODELS 9035, 9036, 9037, 9038 (Ch. 528.53460, 461, 470)

SILVERTONE MODELS 9035, 9036, 9037, 9038 (Ch. 528.53460, 461, 470)

MODEL 9035

TRADE NAME	Silvertone Models 9035, 9036 (Ch. 528.53460, 528.53461); 9037, 9038 (Ch. 528.53470)
MANUFACTURER	Sears, Roebuck & Co., 925 S. Homan Ave., Chicago, Illinois
TYPE SET	AC Operated 6 Tube AM Receiver With 4 Speed Stereo Automatic Record Changer
POWER SUPPLY	110-120 Volts AC, 60 Cycles — RATING 34 Watts, .4 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535 - 1630KC

FOR SERVICE INFORMATION ON RECORD CHANGER - SEE SILVERTONE 528.56310 - PHOTOFACT SET 417 FOLDER 10

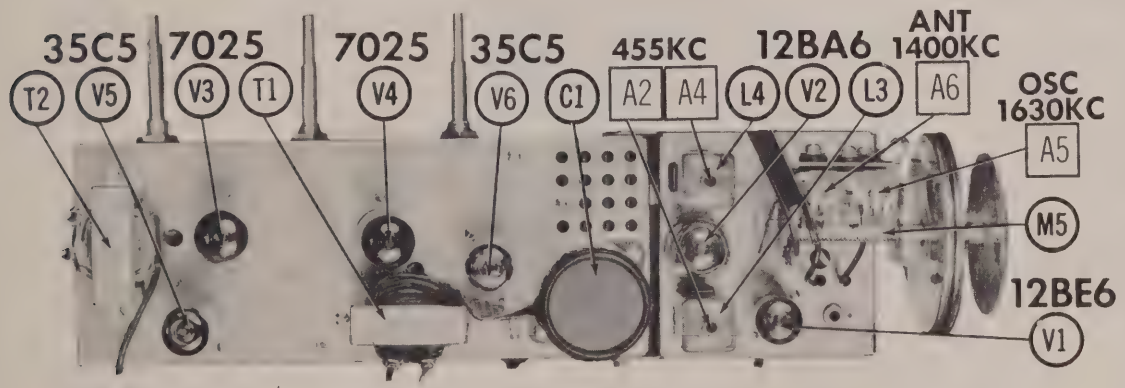
ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested Alignment Tools: A1, A2, A3, A4 ..... GENERAL CEMENT #5009, 8195, 8274, 8275, 8728, 8987
WALSCO #2531
A5, A6 ..... GENERAL CEMENT #5000, 5003, 5014, 5015, 5016, 8276, 8290
WALSCO #2512, 2515, 2522, 2523, 2525, 2537

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1mfd	High side to pin 7 (grid) of Converter. Low side to B-.	455KC (30% 400~ Mod.)	Tuning gang fully open	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2.	"	"	1630KC	"	"	A5	"
3.		Loop	1400KC	1400KC signal	"	A6	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.



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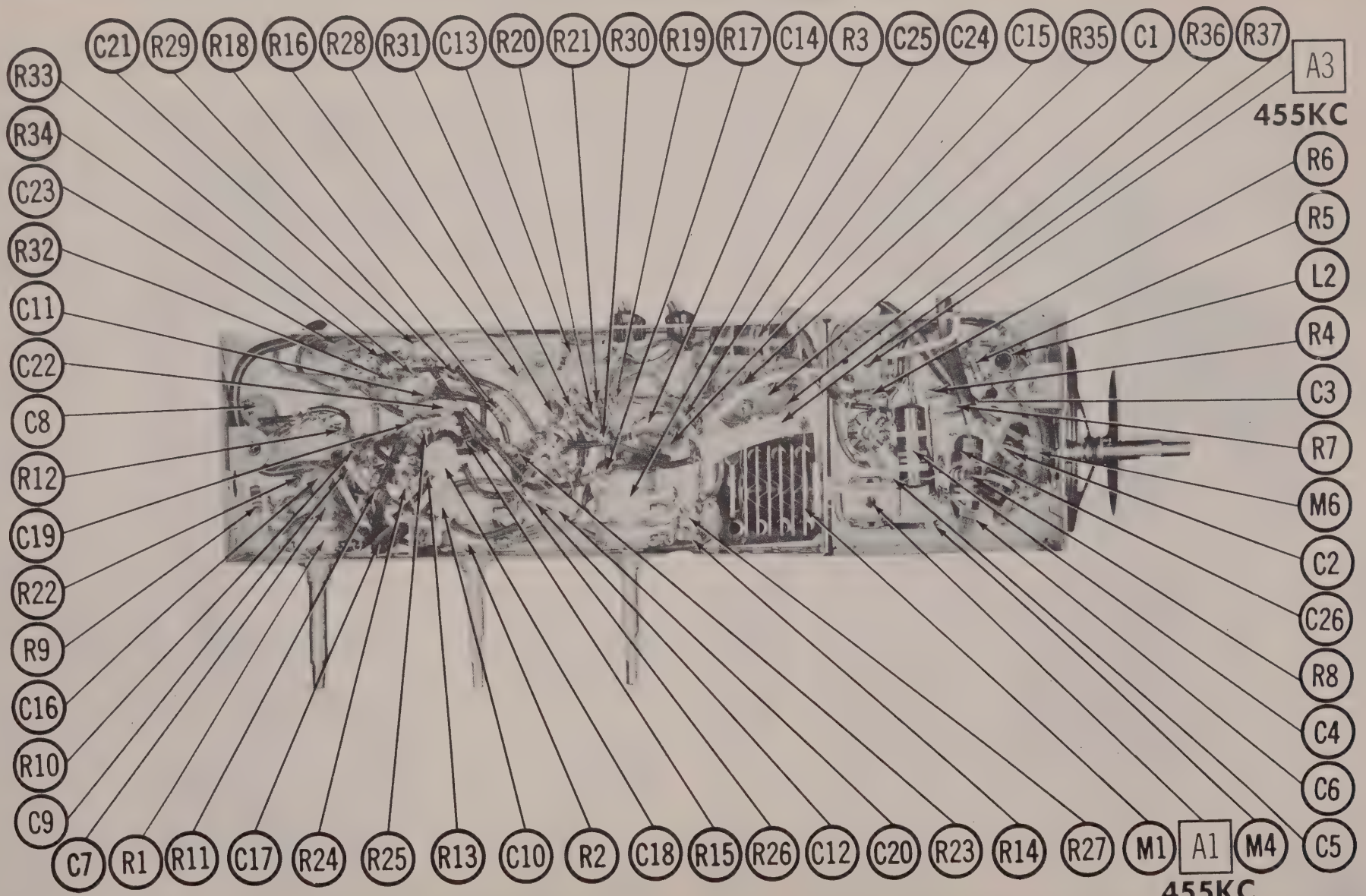
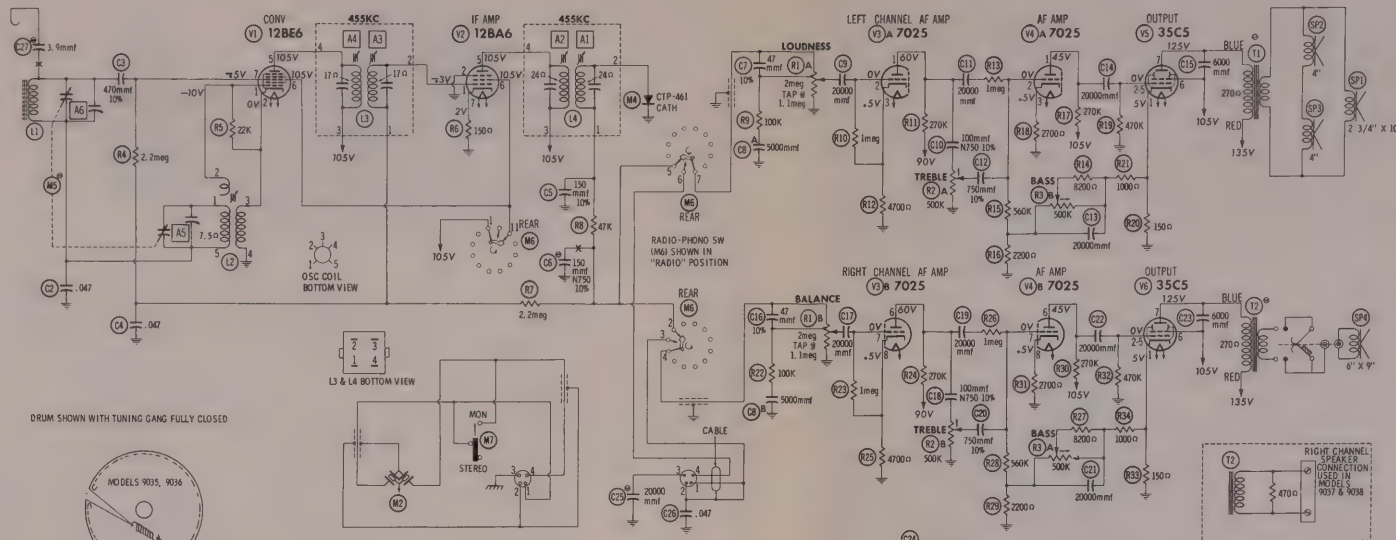
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

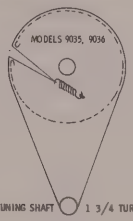
JZ335



CHASSIS-BOTTOM VIEW

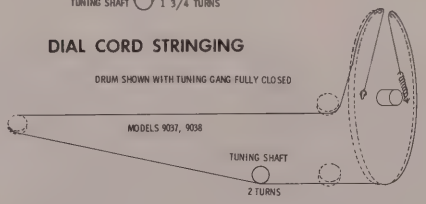


DRUM SHOWN WITH TUNING GANG FULLY CLOSED



DIAL CORD STRINGING

DRUM SHOWN WITH TUNING GANG FULLY CLOSED



❶ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

DENOTES B−

DENOTES CHASSIS

SW ON BASS CONTROL

SW ON CHANGER

135V SOURCE

105V SOURCE

90V SOURCE

83VAC 48VAC 36VAC 24VAC 12VAC

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12BE6	22K	.7Ω	24Ω	36Ω	†1000Ω	†1000Ω	5.5meg		
V2	12BA6	2.7meg	0Ω	36Ω	48Ω	†1000Ω	†1000Ω	150Ω		
V3	7025	†290K	1meg	4700Ω	12Ω	0Ω	†290K	1meg	4700Ω	6Ω
V4	7025	†270K	560K	2700Ω	12Ω	24Ω	†270K	560K	2700Ω	18Ω
V5	35C5	150Ω	470K	48Ω	83Ω	470K	†1000Ω	†270Ω		
V6	35C5	150Ω	470K	83Ω	120Ω	470K	†1000Ω	†270Ω		

† MEASURED FROM OUTPUT OF M1.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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SILVERTONE MODELS 9035, 9036, 9037, 9038 (Ch. 528.53460, 461, 470)

PARTS LIST AND DESCRIPTIONS

TUBES

ITEM No.	USE	TYPE
V1	Converter	12BE6
V2	IF Amplifier	12BA6
V3	Left Channel AF Amp. - Right Channel AF Amp.	7025
V4	Left Channel AF Amp. - Right Channel AF Amp.	7025
V5	Left Channel Output	35C5
V6	Right Channel Output	35C5

ELECTROLYTIC CAPACITORS

ITEM No.	RATING CAP.	RATING VOLT.	REPLACEMENT DATA SILVERTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	▲150	150	18-40-3	AFH3-26	D0014	FP240 TC495	TMD-13 TD-150-150	TVLS-3449.1*	
B	▲50	150							
C	■50	150							

* Not normally in distributor's stock. Available thru distributor on order to manufacturer.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C3	470 10%		DI-470	MD-471	5R5T47	CCS-471	JL-347	MS-347
C4	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C5	150 10%		DI-150	DD-151	L10T15	CCD-151	JL-315	MS-315
C6	150 N750 10%	①	N750-DI 150	DTN-150	C10T15U	CCTN-151	CN7-315	10TCU-151
C7	47 10%		DI-47	DD-470	L10Q47	CCD-470	CNO-447	MS-447
C8A	5000		BPD-005	DD3-503	BYD6DD5	CCD-502	B-250	5HK-D50
B	5000		BPD-005			CCD-502	B-250	5HK-D50
C9	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C10	100 N750 10%		N750-DI 100	DTN-100	C10T1U	CCTN-101	CN7-310	10TCU-T10
C11	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C12	750 10%		DI-750		1R5T750	CCS-751	JL-375	MS-375
C13	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C14	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C15	6000		BPD-0068	DD-682	BYA10D68	6DP-1-602	B-260	5HK-D68
C16	47 10%		DI-47	DD-470	L10Q47	CCD-471	CNO-447	MS-447
C17	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C18	100 N750 10%		N750-DI 100	DTN-100	C10T15U	CCTN-101	CN7-310	10TCU-T10
C19	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C20	750 10%		DI-750		1R5T75	CCS-751	JL-375	MS-375
C21	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C22	20000		BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C23	6000		BPD-0068	DD-682	BYA10D68	6DP-1-602	B-260	5HK-D68

CAPACITORS (cont)

ITEM No.	RATING	REMARKS	REPLACEMENT DATA AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C24	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C25	20000	②	BPD-02	DD-203	BYB6S2	CCD-203	B-120	5HK-S20
C26	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C27	3.9	①			C10V4C			10TCC-V39

① Not used in some versions.
② Some versions of Ch. 528.53470 and Ch. 528.53461 use 20000mmf @ 1000V in this application (Part #20-145-0).

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SILVERTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2meg	1/2	24-339-0					Loudness, Left Channel
	1.1meg tap							Balance, Right Channel
B	2meg	1/2						
	1.1meg tap							Treble, Left Channel
R2A	500K	1/2	24-191-2	AB-60	AD47-500K-Z	Q13-133		Treble, Right Channel
B	500K	1/2		SR-60	Not Req.	M13-133		
C	Shaft			AK-8	RS3/16	NQ		
R3A	500K	1/2	24-190-2	AB-60	AD47-500K-Z	Q13-133		Bass, Right Channel
B	500K	1/2		SR-60	Not Req.	M13-133		Bass, Left Channel
C	Shaft			AK-8	RS3/16	NQ		
D	Switch			KR-1	SWE-12	76-1		Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R4	2.2meg	
R5	22K	
R6	150Ω	
R7	2.2meg	
R8	47K	
R9	100K	
R10	1meg	
R11	270K	
R12	4700Ω	
R13	1meg	
R14	8200Ω	
R15	560K	

ITEM No.	RATING	REMARKS
R16	2200Ω	
R17	270K	
R18	2700Ω	
R19	470K	
R20	150Ω	
R21	1000Ω	
R22	100K	
R23	1meg	
R24	270K	
R25	4700Ω	
R26	1meg	
R27	8200Ω	

ITEM No.	RATING	REMARKS
R28	560K	
R29	2200Ω	
R30	270K	
R31	2700Ω	
R32	470K	
R33	150Ω	
R34	1000Ω	
R35	22K	
R36	1000Ω 1W	
R37	27Ω 2W	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		SILVERTONE PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	84-7256			BC-393			
L2	Osc. Coil	10-50-4			BC-352	12-C1	RF-1	
L3	Input IF	10-108-2	16-6758	16-6758	BC-353	12-C2	RF-2	
L4	Output IF	10-110-2	16-6758	16-6758				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	SILVERTONE PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2600Ω	3-4Ω	80-91-1 ①	22S45	A-2928	AU-603	A-3876	22S45	S-1X	
T2	2700Ω	6-8Ω	80-78-1	22S86	A-2902 ②	AU-604 ②	A-3849 ②	22S86		

① Ch. 528.53470 use Part #80-92-1 in this application.

② Drill new mounting hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	SILVERTONE PART No.	QUAM PART No.	
SP1	2 3/4"x 10"	PM	6-7Ω	33-373-4 ①		① Models 9035, 9036
SP2	4"	PM	3-4Ω	33-256-4 ①	4A07	② Models 9037, 9038
SP3	4"	PM	3-4Ω	33-372-4 ①	4A07	③ 2 used in Models 9037, 9038
SP4	6"x 9"	PM	9-10Ω	33-394-4 ①	69A3	
	6"	PM	3-4Ω	33-254-4 ②		
	4"	PM	3-4Ω	33-299-4 ③		

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	SILVERTONE PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	SARKES TARZIAN PART No.	SYLVANIA PART No.	
M1	.045A	86-15-3 ①	1235AH ①	RS150 ①	150 ①	SR200 ②	① Selenium Type ② Silicon Type

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA							
	SILVERTONE PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		JENSEN PART No.		SONOTONE PART No.	
		CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE	CARTRIDGE	NEEDLE
M2	33-311-0	13T	Not Req.	* 66	Not Req.			† 8T-S	Not Req.

* Use Mount PT-3.

† Includes Mount

PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	SILVERTONE PART No.	CLEVITE WALCO PART No.	JENSEN PART No.	
M3	83-1250 (78)	† E98 or ♦ E98D	† W101STS * or ♦ W101STD *	† Jewel ♦ Diamond * Includes Cartridge
	83-1252 (LP)	† E98X or ♦ E98XD		

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA				NOTES
		SILVERTONE PART No.	CBS PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
M4	CTP-461		1N60	1N60	1N295	Detector (Pigtail)

MISCELLANEOUS

ITEM No.	PART NAME	SILVERTONE PART No.	NOTES
M5	Tuning Cap.	19-77-2	2 Gang, Ch. 528.53460, 461 (Ant. 14-346mmf, Osc. 15-120mmf)
	Tuning Cap	19-78-2	2 Gang, Ch. 528.53470
M6	Switch	69-287-0	Radio-Phono
M7	Switch	69-282-0	Slide Type (On Changer)
M8	Motor	59-72	Complete, Changer Ch. 528.56442 & 528.56443
	Motor	59-89	Complete, Changer Ch. 528.56452 & 528.56453

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	52-1173-0	Tuning, Models 9035 & 9036
Knob	52-1170-0	Loudness (Right Channel), Models 9035, 9036
Knob	52-1173-0	Loudness (Left Channel), Models 9035, 9036
Knob	52-1180	Off-On Loudness, Models 9037, 9038
Knob	52-1169-0	Treble, Models 9035, 9036
Knob	52-1172-0	Radio-Phono, Models 9035, 9036
Knob	52-1171-0	Off-On Bass, Models 9035, 9036
Knob	52-1178-0	Rear, Models 9037, 9038
Knob	52-1177-0	Front, Models 9037, 9038
Cabinet	42-89-3	Model 9035
Cabinet	42-90-3	Model 9036
Cabinet	42-18-4	Extension Speaker, Mahogany
Cabinet	42-19-4	Extension Speaker, Blond
Cabinet	42-93-3	Model 9037
Cabinet	42-94-3	Model 9038
Pointer	52-165-1	Models 9035, 9036
Pointer	52-58-1	Models 9037, 9038

WIRING DATA

General-use Unshielded Hook-up Wire	Use BELDEN No.	8530 (Solid) Available in Ten Colors 8524 (Stranded) Available in Ten Colors
Power Cord	Use BELDEN No.	1765-B (6 Ft. Length) 1725-K (7½ Ft. Length)
Low-Loss Shielded Lead (Interconnecting)	Use BELDEN No.	8401
Phono Pick-up Arm Cable	Use BELDEN No.	8430 (Two Conductor - Twisted)

PHOTOFACT* Folder

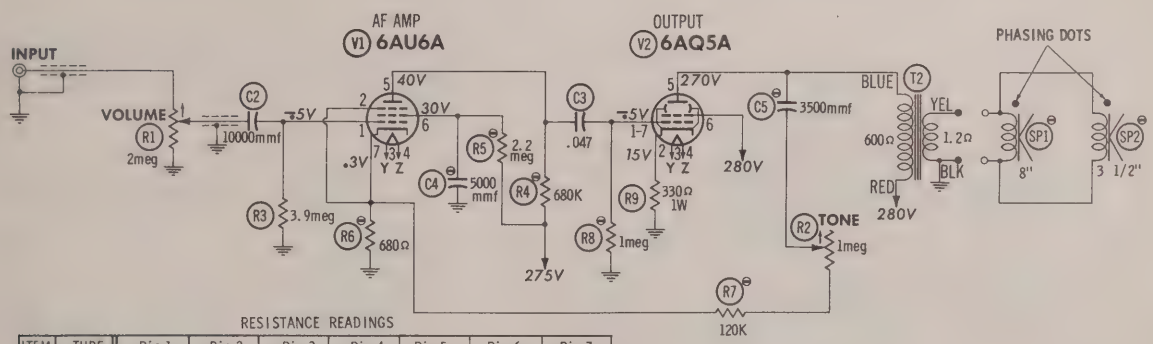
EIA MEMBER ELECTRONIC INDUSTRIES ASSOCIATION

V-M MODELS
161, 162, 163

V-M MODELS
161, 162, 163

MODEL 163

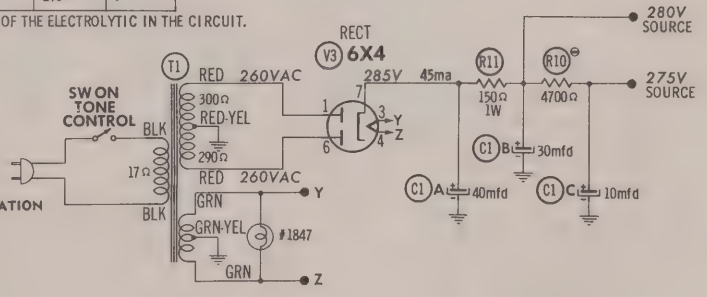
TRADE NAME	V-M Models 161, 162, 163
MANUFACTURER	V-M Corp., Benton Harbor, Michigan
TYPE SET	AC Operated 3 Tube Phono Amplifier
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 28 Watts, .31 Amp. @ 117 Volts AC



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V1	6AU6A	3.9meg	680Ω	.1Ω	.1Ω	†680K	†2.2meg	680Ω
V2	6AQ5A	1meg	330Ω	.1Ω	.1Ω	†750Ω	†150Ω	1meg
V3	6X4	300Ω	NC	.1Ω	.1Ω	NC	290Ω	¶

¶ THIS READING WILL VARY DEPENDING UPON THE CONDITION OF THE ELECTROLYTIC IN THE CIRCUIT.
† MEASURED FROM PIN 7 OF V3.
NC NO CONNECTION.



⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

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SET 465 FOLDER 16

PARTS LIST AND DESCRIPTIONS

TUBES

• CBS • GENERAL ELECTRIC • RAYTHEON • SYLVANIA •					
ITEM No.	USE	TYPE	ITEM No.	USE	TYPE
V1	AF Amplifier	6AU6A	V3	Rectifier	6X4
V2	Output	6AQ5A			

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	V-M PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	NOTES
C1A	40	300	12109	PR4-185	BBRQ0170.5	TCT3764	TDLD-31	TVA-4748	
B	30	300					TD-10-450		
C	10	300							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C2	10000		BPD-01	DD-103	BYA10S1	CCD-103	B-110	5HK-S10
C3	.047 400V		P488N-047	DF-503	CUB4S47	4DP-3-473	GEM-4147	4TM-S47
C4	5000	①	BPD-005	DD-502	BYA10D5	CCD-502	B-250	5HK-D50
C5	3500	①	BPD-004	DD-402	BYA10D4	CCD-392	B-402	5GA-D40

① Some versions may incorporate this part in a componentn combination (Part #19310).

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	V-M PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	2meg	½	12354	B-76	A47-2meg-Z	Q13-139	U55	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R2A	1meg	½	12375	B-70-S	A47-1meg-Z	Q13-137	U53	Tone
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			Not Req.	SWE-12	76-1	US-26	Off-On

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R3	3.9meg	
R4	680K	①
R5	2.2meg	①

ITEM No.	RATING	REMARKS
R6	680Ω	①
R7	120K	①
R8	1meg	①

ITEM No.	RATING	REMARKS
R9	330Ω 1W	
R10	4700Ω	①
R11	150Ω 1W	

① Some versions may incorporate this part in a component combination (Part #19310).

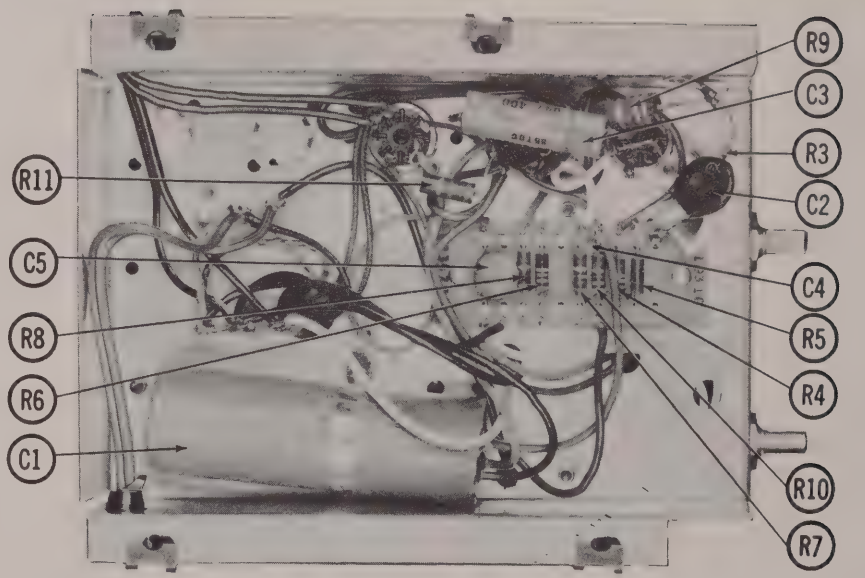
TRANSFORMER (POWER)

ITEM No.	RATING			REPLACEMENT DATA						
	PRI.	SEC. 1	SEC. 2	V-M PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V ⓐ .31A	520VCT ⓐ .045A	6.3VCT ⓐ 1.6A	12596						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	V-M PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	5100Ω	6-8Ω	12579	22S58	A-2902 ①	AU-609	A-3849 ①	22S58	S-55X	① Drill new mounting hole.

CHASSIS—BOTTOM VIEW



SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	V-M PART No.	QUAM PART No.	
SP1	8"	PM	14-16Ω	19423	8A31Z15	① Alternate
	8"	PM		19422 ①		
SP2	3½"	PM	14-16Ω	16755-1	3A15T	
	3½"	PM		16755 ①	3A15T	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	16766-B	Models 161, 163
Knob	16766-C	Model 162
Reject Button	15084-B	Model 162 (Changer)
Reject Button	15283-A93	Model 162
Cabinet	19300-B	Model 161 Blond
Cabinet	19300-M	Model 161 Mahogany
Cabinet	19300-W	Model 161 Walnut
Case Complete	19315-A	Model 162
Case Complete	19320-A	Model 163

WIRING DATA

General-use Unshielded Hook-up Wire ..... Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

Power Cord ..... Use BELDEN No. 1765-B (6 Ft. Length)
1725-K (7½ Ft. Length)

Low-Loss Shielded Lead (Interconnecting) ..... Use BELDEN No. 8401

Phono Pick-up Arm Cable ..... Use BELDEN No. 8430 (Two Conductor - Twisted)

PHOTOFACT* Folder with CIRCUITRACE*

WESTINGHOUSE MODELS H-693P8, H-694P8, H-695P8 (Ch. V-2278-5)

WESTINGHOUSE MODELS H-693P8, H-694P8, H-695P8 (Ch. V-2278-5)

MODEL H-694P8

WESTINGHOUSE MODELS H-693P8, H-694P8, H-695P8 (Ch. V-2278-5)

TRADE NAME	Westinghouse Models H-693P8, H-694P8, H-695P8 (CH. V-2278-5)
MANUFACTURER	Westinghouse Electric Corp., Metuchen, N. J
TYPE SET	Battery Operated Portable Transistorized AM Receiver
POWER SUPPLY	9 Volts DC
TUNING RANGE—BROADCAST	540 – 1625KC
RATING	6.6 MA @ 9 Volts DC (No Signal, Min. Volume) 9.5 MA @ 9 Volts DC (Signal, Normal Volume)

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.

Suggested alignment tools:

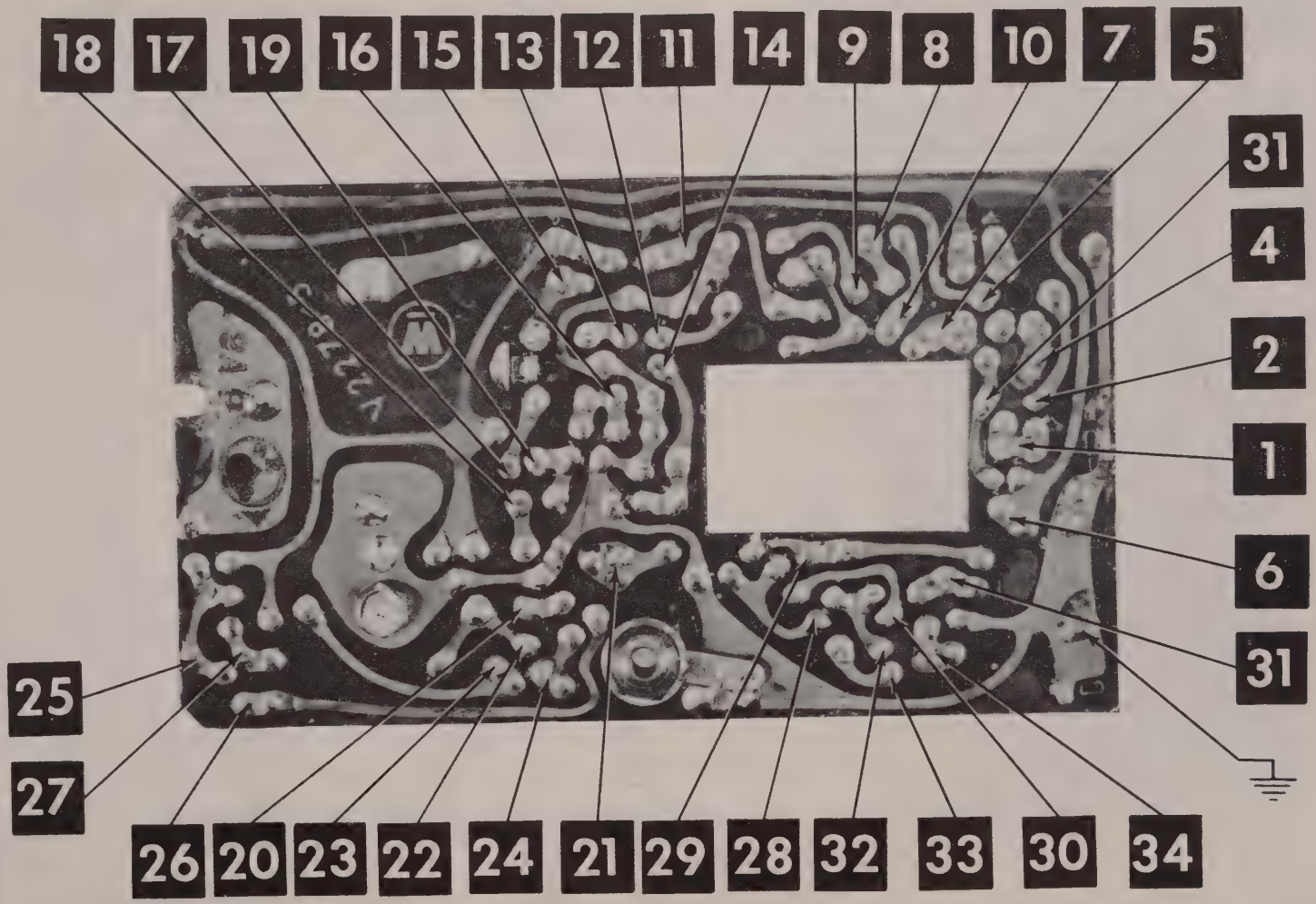
A1, A2, A3.....GENERAL CEMENT #8607, 9291
WALSCO #2520, 2522, 2524, 2537
A4, A5.....GENERAL CEMENT #5004, 5008, 5009
WALSCO #2520
A6.....GENERAL CEMENT #9440

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.		Loop	455KC (400∿ Mod.)	Tuning gang fully closed.	Across voice coil	A1, A2, A3	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
2.		"	1625KC	Tuning gang fully open	"	A4	"
3.		"	1400KC	1400KC Signal	"	A5	"
4.		"	600KC	600KC	"	A6	If necessary, adjust for maximum output. Repeat Steps 2, 3, & 4.

HOWARD W. SAMS & CO., INC. Indianapolis 6, Indiana

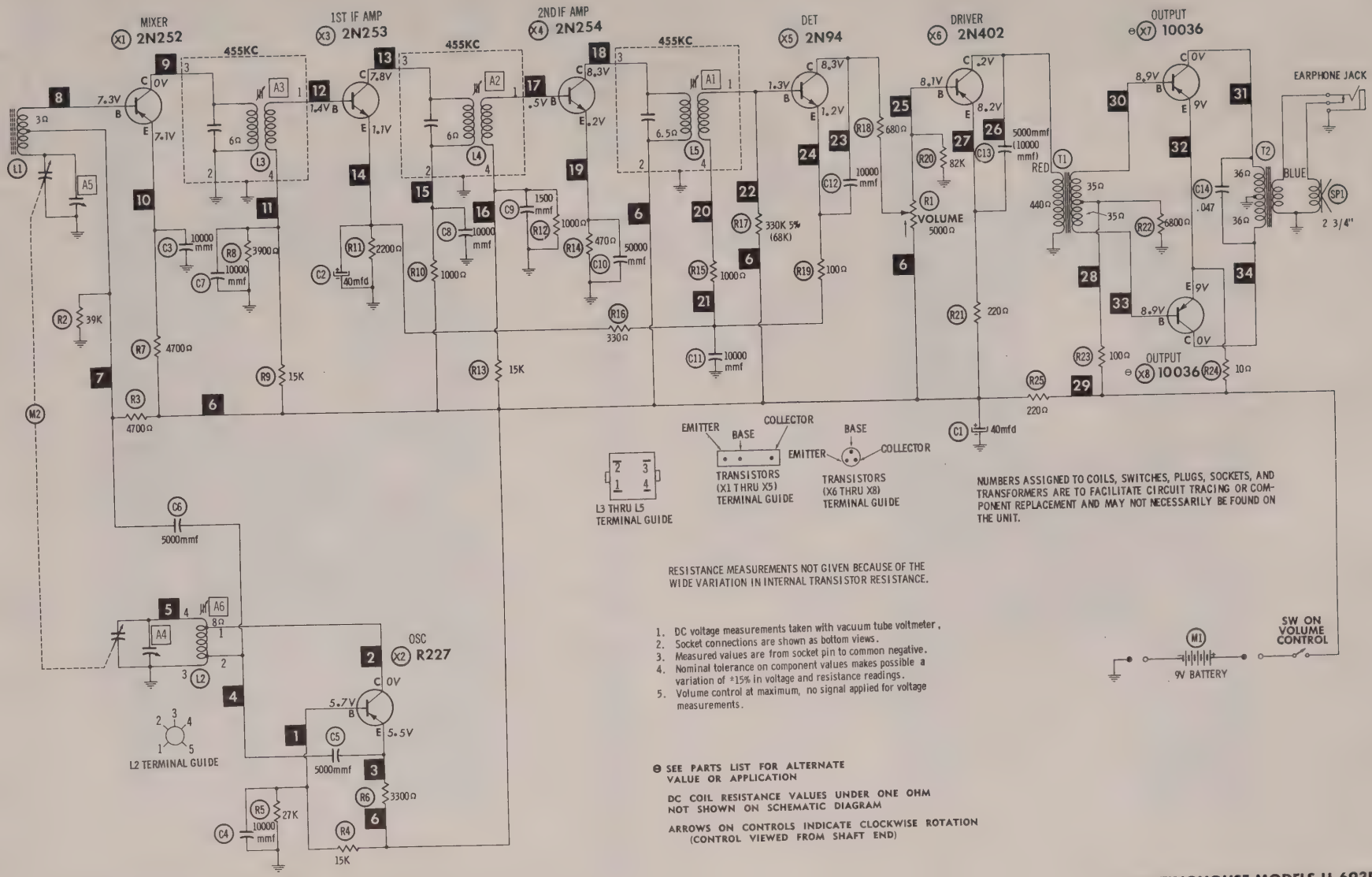
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1959 Howard W. Sams & Co., Inc., Indianapolis 6, Indiana. Printed in U.S. of America

JF393



A Howard W. Sams CIRCUITRACE® Photo

PRINTED BOARD



NUMBERS ASSIGNED TO COILS, SWITCHES, PLUGS, SOCKETS, AND TRANSFORMERS ARE TO FACILITATE CIRCUIT TRACING OR COMPONENT REPLACEMENT AND MAY NOT NECESSARILY BE FOUND ON THE UNIT.

RESISTANCE MEASUREMENTS NOT GIVEN BECAUSE OF THE WIDE VARIATION IN INTERNAL TRANSISTOR RESISTANCE.

1. DC voltage measurements taken with vacuum tube voltmeter.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM

ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)

A PHOTOFACT STANDARD NOTATION SCHEMATIC with CIRCUITRACE®

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WESTINGHOUSE MODELS H-693P8, H-694P8, H-695P8 (Ch. V-2278-5)

PARTS LIST AND DESCRIPTIONS

TRANSISTORS

ITEM No.	ORIG. TYPE	USE	REPLACEMENT DATA				NOTES
			CBS PART No.	RCA PART No.	RAYTHEON PART No.	SYLVANIA PART No.	
X1	2N252	Mixer		2N411	2N486		PNP
X2	R-227	Oscillator		2N411	2N488		PNP
X3	2N253	1st IF Amp.				2N94A	NPN
X4	2N254	2nd IF Amp.				2N94A	NPN
X5	2N94	Detector				2N94	NPN
X6	2N402	Driver		2N408	2N362	2N217	PNP
X7	10036 ①	Output		2N408	2N632	2N270	PNP Matched
X8	10036 ①	Output		2N408	2N632	2N270	PNP Pair

① Some versions may use type 10037, 10038, 10039.

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT.	Westinghouse PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SPRAGUE PART No.	
C1	40	10	218V012H01	PWE10040	EC50-10	TT15X40	ML40-15	TE-1119	
C2	40	3	218V012H02	PWE3040	EC40-3	TT3X40	ML40-6	TE-1053	

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING	REMARKS	REPLACEMENT DATA					
			AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ELMENCO PART No.	MALLORY PART No.	SPRAGUE PART No.
C3	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C4	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C5	5000		BPD-005	DDM-502	H-05D5	CCD-502	TA-250	TG-D50
C6	5000		BPD-005	DDM-502	H-05D5	CCD-502	TA-250	TG-D50
C7	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C8	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C9	1500		BPD-0015	DD-152	L10D15	CCD-152	B-215	5HK-D15
C10	50000		BPD-05	DDA-503	H-05S5	DP-2-503	TA-150	TG-S50
C11	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C12	10000		BPD-01	DDM-103	H-05S1	CCD-103	TA-110	TG-S10
C13	5000	(10000) #	BPD-005	DDM-502	H-05D5	CCD-502	TA-250	TG-D50
C14	.047 100V		V84C2S47	DDA-503	DJ2S5	DP-2-473	GTM-2147	9ID47392S2

Alternate

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Westinghouse PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1	5000Ω	1/4	270V024H01					Volume & Switch

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING	REMARKS
R2	39K	
R3	4700Ω	
R4	15K	
R5	27K	
R6	3300Ω	
R7	4700Ω	
R8	3900Ω	
R9	15K	

ITEM No.	RATING	REMARKS
R10	1000Ω	
R11	2200Ω	
R12	1000Ω	
R13	15K	
R14	470Ω	
R15	1000Ω	
R16	330Ω	
R17	330K 5%	

ITEM No.	RATING	REMARKS
R18	680Ω	
R19	100Ω	
R20	82K	
R21	220Ω	
R22	6800Ω	
R23	100Ω	
R24	10Ω	
R25	220Ω	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		Westinghouse PART No.	Gramer PART No.	Meissner PART No.	Merit PART No.	Miller PART No.	Ram PART No.	
L1	Loopstick	310V012H04						
L2	Osc. Coil	230V075H01						
L3	1st IF Trans.	235V014H01						
L4	2nd IF Trans.	235V014H01						
L5	3rd IF Trans.	235V014H02						

TRANSFORMER (DRIVER)

ITEM No.	TURNS RATIO		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	2.5	1	430V024H02						

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA							NOTES
	PRI.	SEC.	Westinghouse PART No.	Halldorson PART No.	Merit PART No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	1450Ω CT	12Ω	430V025H02							

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Westinghouse PART No.	QUAM PART No.	
SP1	2 3/4"	PM	12Ω	570V004H01		

BATTERIES

ITEM No.	VOLTAGE	Westinghouse PART No.	REPLACEMENT DATA						NOTES
			BURGESS		EVEREADY		MALLORY		
			"A"	"B"	"A"	"B"	"A"	"B"	
M1	9V			P6M		226		M1600	

MISCELLANEOUS

ITEM No.	PART NAME	Westinghouse PART No.	NOTES
M2	Tuning Cap	330V005H05	2 Gang

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	550V112H01	Tuning
Knob	550V017H01	Volume
Cabinet	513V025H04	H-693P8
Cabinet	513V025H05	H-694P8
Cabinet	513V025H06	H-695P8

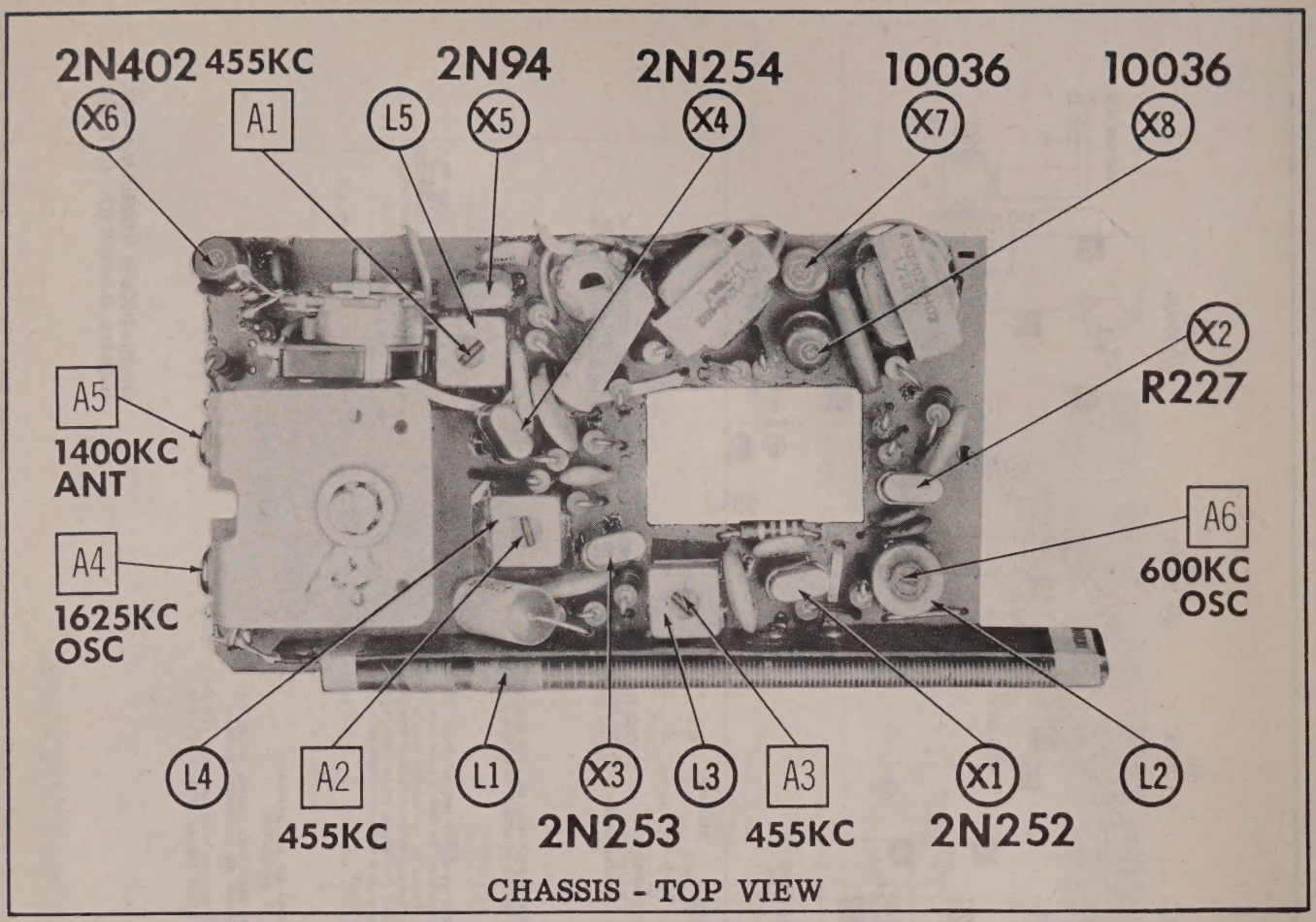
WIRING DATA

General-use Unshielded Hook-up Wire .....Use BELDEN No. 8530 (Solid) Available in Ten Colors
8524 (Stranded) Available in Ten Colors

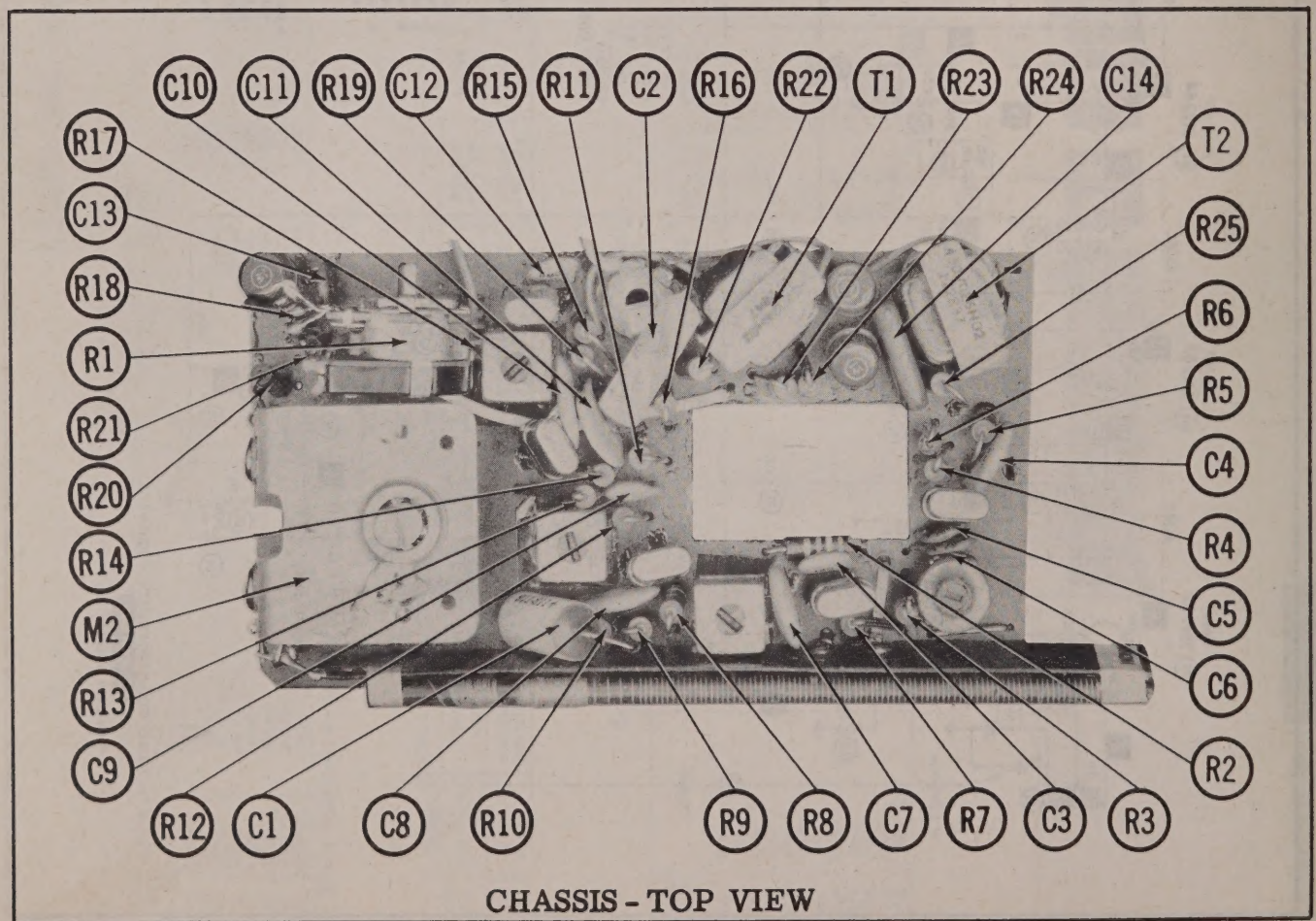
DISASSEMBLY INSTRUCTIONS

DISASSEMBLY

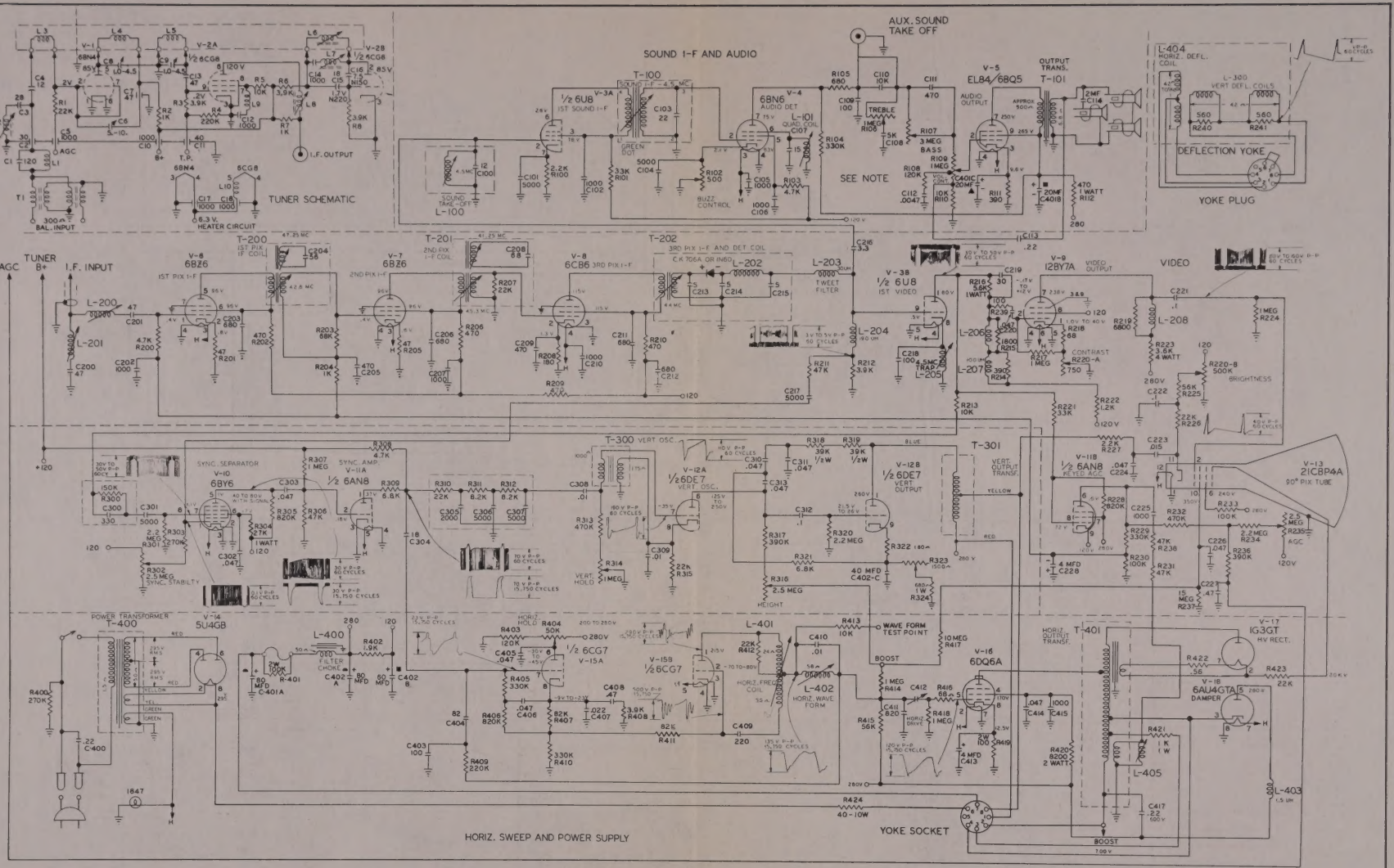
1. Remove tuning knob. (Loop string under knob and pull up.)
2. Loosen screw on cabinet back. Remove back.
3. Remove screw from tuning gang end of printed board.
4. Slide printed board toward tuning gang end of cabinet to free speaker bracket from opposite end of cabinet.
5. Raise speaker end of board up and away from cabinet. Slide printed board from cabinet.



CHASSIS - TOP VIEW



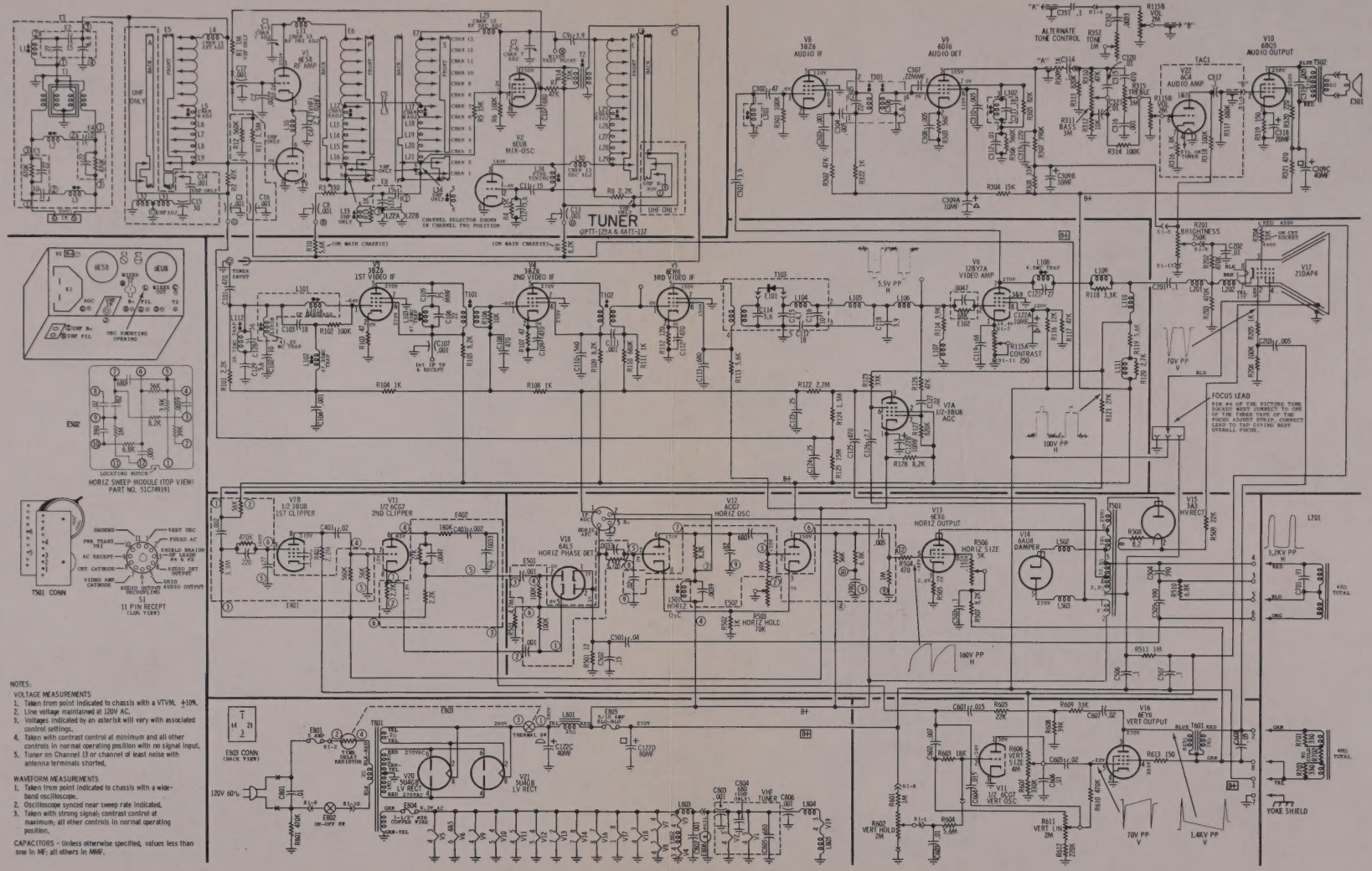
CHASSIS - TOP VIEW



NOTE: ON SOME MODELS C109 BECOMES 470 MMF AND C111, C108, R106 AND R107 ARE OMITTED.

MATHES MODELS 1121, 2121, 3121A, 5221A, 6221A, 8224

Schematic Diagram Courtesy of Mathes Mfg. Co.



NOTES:

VOLTAGE MEASUREMENTS

1. Taken from point indicated to chassis with a VTVM, ±10%.
2. Line voltage maintained at 120V AC.
3. Voltages indicated by an asterisk will vary with associated control settings.
4. Taken with contrast control at minimum and all other controls in normal operating position with no signal input.
5. Tuner on Channel 13 or channel of least noise with antenna terminals shorted.

WAVEFORM MEASUREMENTS

1. Taken from point indicated to chassis with a wide-band oscilloscope.
2. Oscilloscope synced near sweep rate indicated.
3. Taken with strong signal; contrast control at maximum; all other controls in normal operating position.

CAPACITORS - Unless otherwise specified, values less than one in MF; all others in MMF.

MOTOROLA MODELS A21K131CW, A21K1 W, A21K134W, A21K135W, A21K136W, Y21K131CW, Y21K132W, Y21K134W, Y21K135W, Y21K136W, 21K131CW, 21K132W, 21K134W, 21K135W, 21K136W (CH. TS-558, Y, WTS-558)

Schematic Diagram Courtesy of Motorola Inc.

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